MOTOR AGE

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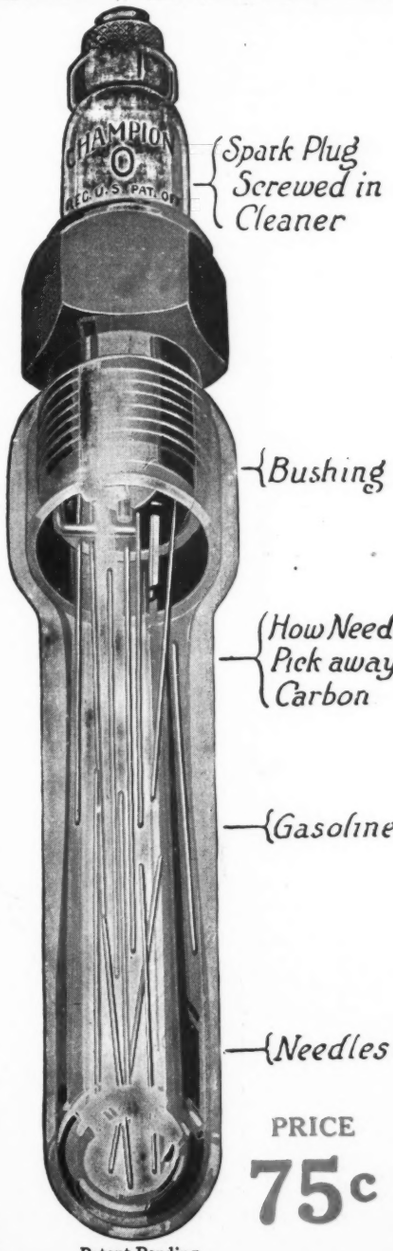

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Editorial Contents—Page 3

Advertisers' Index—Next to Last Page

In This Issue—The Spring Cleanup

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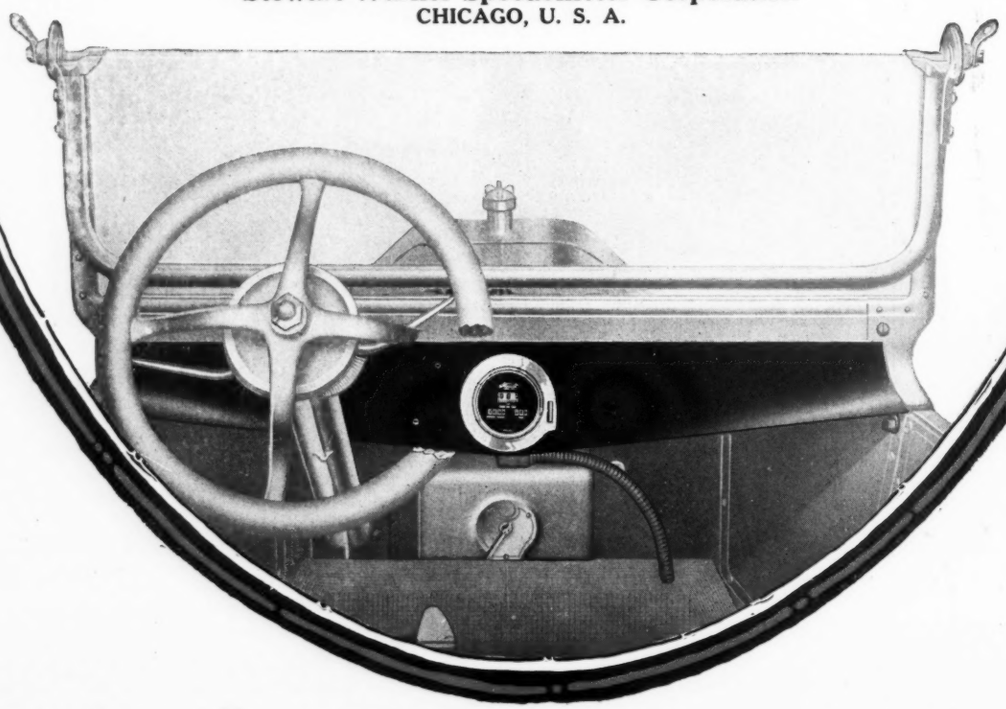

MOTOR AGE

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Vol. XXXI March 8, 1917 No. 10

Contents

THE SPRING CLEAN-UP..... 5
How you should treat your car this time of year.
COOPER WINS AT ASCOT..... 11
EDITORIAL—THE SEASON OF CLEANLINESS—WANTED—PERMANENT ROADS—WHERE WILL WE PARK?..... 12
TWENTY-TWO MAKERS AT BOSTON SALON.. 15
AT BOSTON—THE POTATO SHOW..... 16
Homely Murphy helps make this New England Exhibit the biggest ever.
K. C.'S MOTOR MART..... 20
ARIZONA, WHERE TEPEE PREVAILS..... 23
AT HOME WITH THE EMERSON..... 29
1916 EXPORTS LEAD 1915..... 33
ELECTRICAL EQUIPMENT OF THE MOTOR CAR 35
MOTOR CAR DEVELOPMENT 40
Federal truck, Wolverine and Four Wheel tractors and Weidely engine described and illustrated.

DEPARTMENTS.

FROM THE WOMAN'S VIEWPOINT..... 38
THE ACCESSORY CORNER..... 45
READERS' CLEARING HOUSE..... 46
AMONG THE MAKERS AND DEALERS..... 50
FROM THE FOUR WINDS..... 52

ANNOUNCEMENT.

The next issue will contain a feature story on Montgomery, Ala., "Montgomery—Cradle of the Confederacy," in which you may learn of yet another touring possibility that comes in the cities on the route your tour follows.

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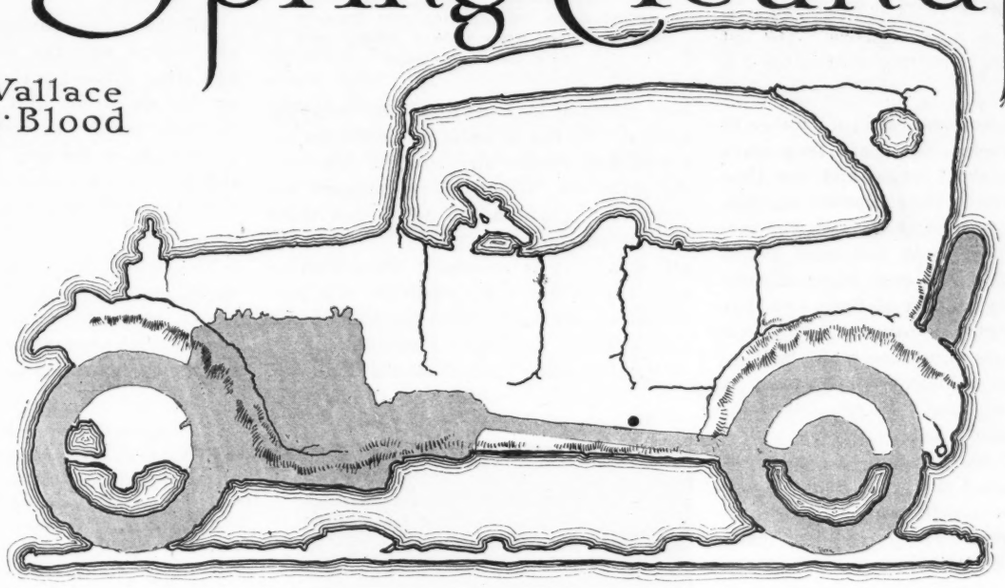
It pays to be a *Studebaker* dealer

Vol. XXXI, No. 10 Chicago, March 8, 1917 $3.00 per Year

MOTOR AGE

The Spring Cleanup

by Wallace B. Blood



SPRING! Should we start this story with a poem? "Nothing doing," says the editor. "You're supposed to tell 'em how to do something. There will be enough music and poetry in the purr of their engines after they have got them overhauled. You tell how to make 'em sing and let the cars furnish the ballads."

That is how a good idea is blasted. I had the first line all prepared: "Spring, spring beautiful spring—" but what's the use. I am going to tell you a list of things to do. These are main things and they have their branches—just like a river. They are as necessary to a satisfactory-operating car as moulting is to a bird. When the snow melts away and the surface of the sidewalk presents itself to the sun, it is indeed a sorry looking sight. It is crusted with the soot and the dirt of a winter—and it needs cleaning. You may have stored your car through the winter. You may have driven it. Whatever you have done, it probably needs a general renovating.

When a car is driven through the winter, the drives are necessarily short. The car sort of gets into the swing of short trips and it is as unfit for long trips as the untrained citizen would be for a marathon run. It needs a rub down and its system needs cleaning out.

You will find on this page a list of twenty things which need to be done to prepare your car properly for the good-weather driving. Study this list. Maybe you have done a good many of these things before this story has reached you. Maybe there are some left which you had not thought of. It is my guess that you have not done any of them. Am I right?

I am going to put a number in front of the paragraph which introduces the information on each one of these subjects. This will make it easy. Just find the ones in the list you want to read about, look at the number, turn to that number, and there you are. But you had better read the whole story.

Before you start work on your car, prepare yourself for the work you have before you. Don't set aside a Saturday afternoon or—may we mention it?—a Sunday morning to do some overhauling and then spend about three-quarters of the time prowling around supply houses after the material to work with.

Buy your material on your way home from work or in the evening, and have it on the spot when you get into those last-summer overalls that the wife had such a time getting the grease spots out of. The very first thing you should look to is your tool kit. After a season of driving tools are lost, loaned or stolen, and you do not realize the deficiency until you have checked up.

Look into the nooks of your car and clean them out. During the winter months, if you have been driving, you have shoved things under the seats and into the tool box with numb hands and a resultant lack of care. It is my guess that your tool box is one grand jumble and you had better clean it out. Go down to the bottom. Those old, greasy rags are not doing any

DO THIS
Or Have It Done

1—Remove carbon from engine.
2—Grind valves.
3—Clean gasoline line.
4—Flush out crankcase.
5—Adjust valves.
6—Care for clutch.
7—Clean and oil gearset.
8—Clean and oil universals.
9—Clean and oil differential.
10—Adjust bearings.
11—Adjust brakes.
12—Care for tires.
13—Renovate chassis.
14—Clean and polish body.
15—Touch up exposed metal.
16—Care for top.
17—Care for curtains.
18—Look it all over again.
19—Learn how to do it—read this story.
20—Do it—by all means.

MAP OF MOTOR CAR

Shaded portions show areas which need attention

good down there in the dark. Throw them out and put in some clean white ones.

The best incentive for a careful and thorough overhauling is to have things neat and shipshape before you start. If the tonneau is full of spare tires, rags, tools and junk, or the garage floor is a mass of dirt and litter, the psychological effect will not improve your work. You would not have a very good appetite for dinner if the dirty breakfast dishes were still on the table.

All right! Everything is clean and trim and you are ready for business. The list says that carbon removing constitutes No. 1, so here goes.

1 Carbon can be removed in a number of different ways. Some are long ways and some are short ways, and the time required depends on the equipment one has.

The oxygen method of burning out carbon is being used more and more extensively in garages. We even know of some owners who have plants of their own, but it is a considerable investment for one-car use. The process is not one which will do damage to the cylinders and pistons, as some people suppose. If properly handled it is perfectly safe.

The day before operations are to begin the engine should be given the conventional kerosene treatment. A half tumblerful of kerosene is poured into each cylinder and permitted to remain there over night.

As a precaution against fire, the gasoline should be shut off from the carbureter and the engine started so that the fuel in the line will be consumed first. Work is done on one cylinder at a time. If the engine is constructed with a cylinder plug, remove this. If it has no plug use the spark plug hole. The engine is turned over until the piston is at top center. The spark plugs should be removed, as the flame will burn the points and otherwise damage them, if they are not. Old spark plugs inserted in the holes will facilitate matters.

Most of the outfits for this work are fitted with gages. The cock should be opened for a pressure approximating 12 lb. The hose attached to the tank has at its end an injector tube. This tube is directed into the cylinder, as shown in Fig. 4. The injector is controlled by a valve, either with a trigger or an easily operated handle. A lighted match is dropped into the cylinder and the injector tube inserted, igniting the carbon. The tube should be moved constantly to cover as large an area as possible.

The combustion of the carbon is accompanied by sparks and probably some flame from the burning oil. Once this carbon begins to burn the action is continued as long as the oxygen is being supplied. Remember, spark plugs will not stand the strain. If you do not want to buy new ones, take them out and put old ones in their place.

Another commonly used method of carbon removal is known as the scraping process. Carbon scraping is sometimes accomplished successfully without removing the cylinders. Usually three scrapers are required to perform this work, and these may be obtained from any motor car supply store. It is necessary oftentimes to have the scrapers designed for the particular engine upon which they are to be used. There are types procurable, however, that have spring shanks that will permit the scraper to be directed into all the crooks and crevises of the cylinder. Fig. 8 shows three forms of scrapers and how they are used.

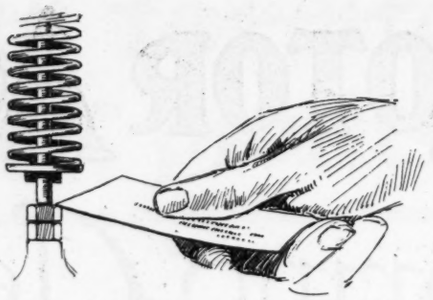


Fig. 1—A simple method of adjusting valves is to set the clearance between the stem and lifter with a calling card as a measuring gage

The first step in scraping carbon is to drain all the oil out of the crankcase and, if possible, take off the cover of the oil reservoir. The cylinder plug should be removed. Of course, if the engine has a detachable head the scraping process is a simple matter and needs no great amount of directions.

All the valves should be removed from the engine and the magneto, carbureter and other exposed parts covered with cloth so that no carbon dust will make its way to these parts. In removing the valves, place them on the work bench in the order that they are removed so that in replacing them they will be put back in their proper order.

The scraper with a flat scraping surface should be used first. This tool should be drawn back and forth across the piston head, and the operation repeated until the scratching sensation disappears and the

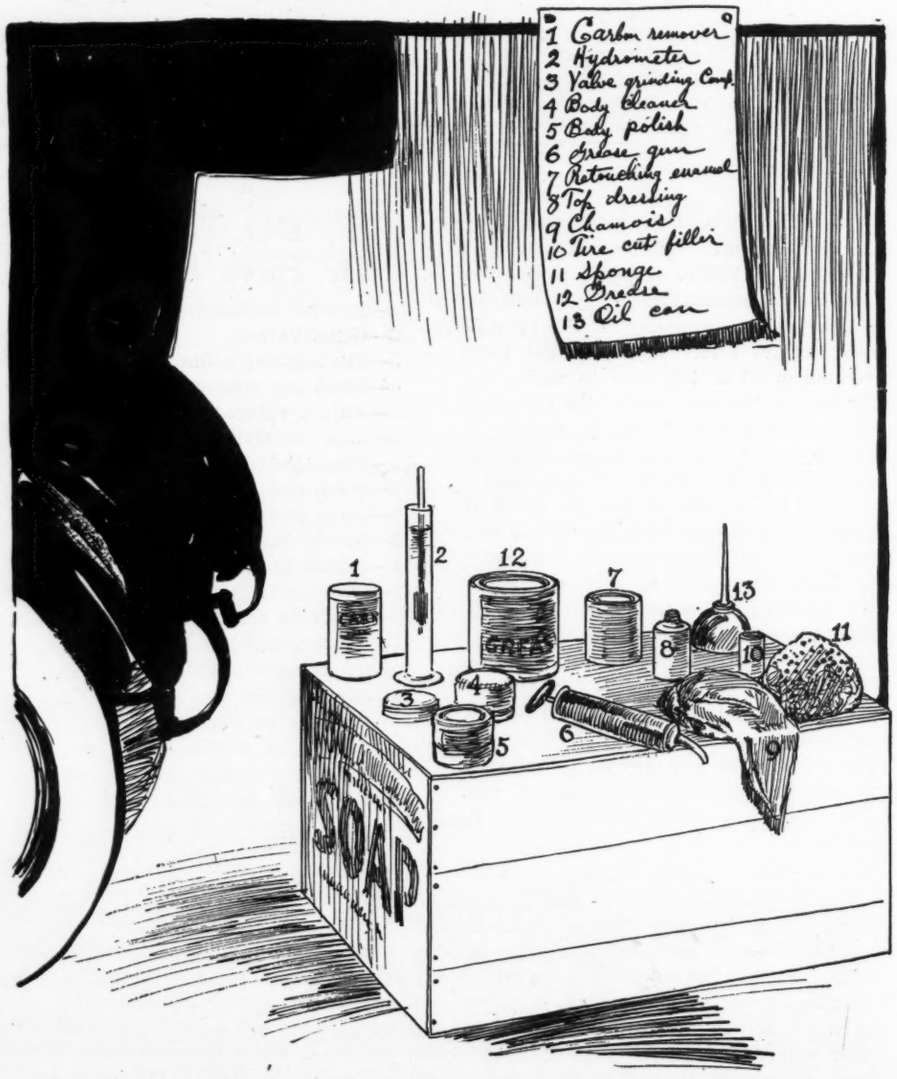


Fig. 2—Equip yourself with every article you need before starting the cleanup. Your efficiency will tumble if you have to chase after things once you have started work

scraper seems to glide over the surface with which it is in contact. The scratching sensation is due to the scraper cutting the crystaline carbon deposit. Care should be taken not to gouge grooves into the metal. If there is a plug on the other side of the cylinder the scraper should be inserted and the scraping resumed on the other side of the piston. Remember! Don't turn the engine over when the carbon is being scraped. The fine particles of carbon will work their way into the rings and cause trouble. If compressed air is available a blast should be turned into the cylinder every few minutes to blow the free carbon out. A hand bellows will serve if there is no compressed air. You can even use a hand tire pump.

After the piston has been thoroughly scraped, the cylinder head should get its treatment. It is difficult to get a scraper that will suffice for every make of motor. The curvature of the scraper for the cylinder head should be equal to the curvature of the top of the cylinder, or very nearly so. It may be that a pointed scraper will be the only one which will fit the job and it will be a long painstaking process to get all the carbon off with this instrument.

Scraping should continue in all directions until the blast of air does not blow out any more carbon dust. Too much scraping is as bad as too little. If the scraping is not carefully done there will be jagged edges of carbon which will heat from the motor explosions, become incandescent and cause premature firing.

After as much carbon as possible has been removed from the cylinders, a half tumblerful of kerosene should be poured into each one and the engine turned over a few times. The crankcase should be thoroughly flushed out with kerosene, drained and new oil inserted. The valve

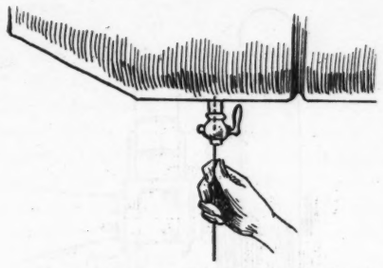


Fig. 3—If you will clean out all petcocks with a fine wire you will find the oil will drain out faster

seats and all other working engine parts should have their kerosene bath and receive a re-oiling.

It is customary to grind the valves after removing carbon by the scraping method.

Another and probably the most modern method of carbon removing is done by the insertion of liquid or carbon removing compound into the cylinder, allowing this liquid to remain in the cylinder and burning it out in the morning. It is performed in exactly the same manner as the kerosene method, although, of course, the reagents have more powerful action on the carbon. In selecting a liquid carbon remover it is well to ascertain that it is composed of materials which, when mixed with engine oil, will not deteriorate this oil as will kerosene. A good test is to wipe a piece of metal with oil and pour a little of the carbon remover on it. If the carbon remover cuts the oil in the same manner as kerosene or gasoline, it is natural to suppose that it will not help things much if it gets into the oil in the crankcase, and it will surely get in, some of it; there is no preventing that.

2 It is not a difficult process to grind in valves. It is a slow process, and is better done the more patient and untiring the operator is. But don't let them tell you it requires a trained expert or a master mechanic. Such is not the case.

The first thing to do in grinding valves is to separate the valves from the parts which are holding them fast. In practically all engines the valve springs are held in place on the valve stem by a key. To release this key it is necessary to compress the spring and drive this key out. Probably more profanity has been delivered in ovation over this little job of releasing a valve spring than in any other repair job on a motor car. This verbal outlet of bad temper can be directly attributed to the fact that the operator fooled around with his hands first and used his brains afterwards. Do not try to remove that spring without formulating some plan in your head for its removal before you start operations.

Of course, the best thing to have is a tool especially designed for the purpose. There are several very neat little devices on the market that handle this job of valve compressing in commendable style. If you haven't one of these you have got to pry the spring up. Now stop and think it over. Don't try to do it with a file. A file is made of brittle metal, and it does not take much pressure to snap it in two. If it does break and it happens that none of the flying pieces lodge in your eye, you are going to cuss—and once you start cussing your efficiency will decrease in direct proportion.

Get a bar of steel. That will not break, and it will give plenty of leverage. If you can get some one to help with the prying you will have less trouble in getting the key out.

Now, we will suppose that you have removed the key without a single cuss. You should provide yourself with a valve-grinding compound. Are you going to grind your valves after reading this story? All right, then put that down on a piece of paper. Buy some valve-grinding compound. Lift the valve out of its seat and apply this grinding paste to the rim of the seat. Put on an even coat and don't plaster it all around the surrounding metal parts. Take your time. Cover the tapered part of the valve itself with the compound and drop the valve in its seat.

Now, look on the top of the valve head. You will find a slot cut in there which will take just nicely the point of a screw driver. Did it surprise you? Those slots are in all valves. Put the point of your screw driver in this slot and start business. Now, a man who grinds valves for a living, or part of a living, holds the screw driver between the palms of both hands and twirls the screw driver in the same manner the Indians used to twirl those crude sticks they used to make fire with.

You try this and see how it works. It may be that you are so clumsy at it that the point of the screw driver keeps slipping everlastingly out of the slot. It may be that your natural grace will make you

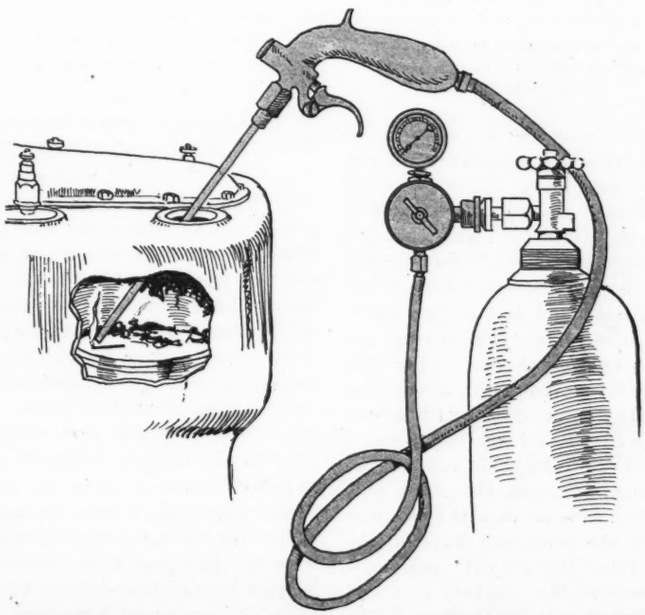


Fig. 4—The oxygen equipment for removing carbon. There is an oxygen tank, a pressure gage, turbine and a trigger valve. A lighted match dropped into the cylinder starts combustion of the carbon

fall into the motion as if you had done it all your life. Now, don't write me and say that it worked fine the first time. I know you're graceful. If it does not work, just go at it with the screw driver held in the regular way in the palm and fingers of one hand, and set yourself for a patient siege of labor.

Do not press down hard on the valve. Do you strop your own razor? You don't push away against the strop until the edge of your razor is round instead of sharp. You can grind a valve seat in 2 mins. by pushing down hard with the screw driver. You can do a lot better job in 10 mins. by pushing easily. Push lightly. After you have ground for a period which, in your mind, is enough to give the seat a surface like a mirror, wash off the compound with gasoline. Be careful now. Don't wash it down into the valve guides or starter or generator or magneto. Put a rag underneath to catch the drippings. If there is a shiny surface over the entire face of the seat and the valve head, the job is done. If there are dark spots, start all over again and grind these spots off. It will take a long time to go over all of the valves thoroughly. You might as well not do the job at all, though, as to do it hastily and poorly. When it is all done wash every bit of compound out of the working parts. Remember that stuff is grinding compound and it will keep right on grinding whatever it gets into.

There should be no play between the valve stem and the guide. If there is, either a new valve or a new valve guide bushing will remedy the trouble. If there are no bushings, a valve with an oversize stem will take up the play, and you can probably get this from the factory. This play later causes air leaks and oil leaks. If any valve spring is much shorter than the rest replace it.

3 You had better clean out that gasoline line. You had better take the carbureter apart and give it a bath. Disconnect the gasoline lines at both ends. Put your mouth over the end and blow. If there seems to be a clog, if your blowing takes more effect than seems necessary, run some soft iron wire back and forth through the pipe. Soft iron wire will follow the curve of the pipe and clean it out thoroughly. Give the needle valve and its seat a careful examination. If either is blackened or burred dress off the irregularities very carefully with fine emery paper. Be careful in this job. A little too much dressing will give an uneven seat.

Flush the bowl of the carbureter and examine all the parts to see if any dirt or gummy substance has adhered to it. In fact, go over the whole gasoline feed system and see that it is absolutely clean. One little grain of dirt the size of a pin head, if it works into some certain place, may stop up the whole system, and you would look and look before you found the trouble.

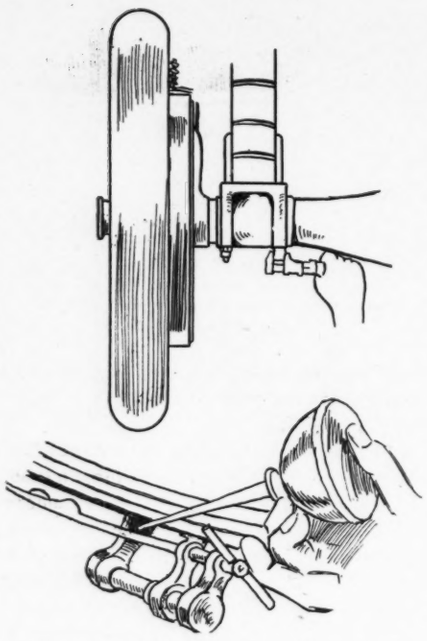


Fig. 5—Tighten the nuts on the ends of all the spring clips. Spread the spring leaves and fill them with oil or graphite

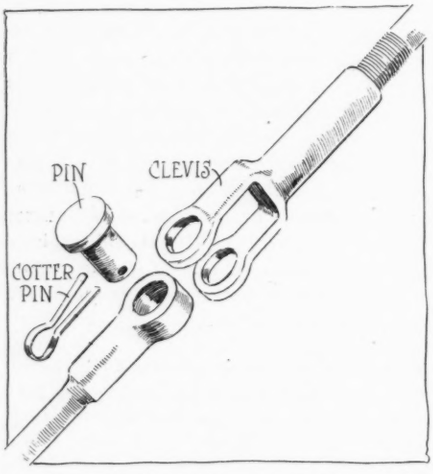


Fig. 6—This is the way to take that yoke apart when you start to adjust the brake rods

4 If you have scraped the carbon you have also drained the crankcase, if you have followed directions. If you have not heretofore drained the crankcase, there is no excuse in the world for leaving the job undone. If you have stored your car for the winter, the oil which you left in it has thickened and the dirt and carbon which had accumulated in the fall driving has settled and lodged on the case. For this reason the flushing should be a vigorous one. Use plenty of kerosene and keep the drain closed. Better to leave the kerosene in over night and drain it out in the morning. When you open the drain cock turn the engine over so that the compression caused by the downward travel of the pistons will force the oil out vigorously. You can even cork the breather pipe and get still more violent discharge of the kerosene.

Be sure that every bit of the kerosene is drained out. Even a teacupful of it, when mixed with the fresh lubricating oil will so weaken that oil that it will not lubricate the engine properly. Put in a supply of fresh oil and this job is done.

5 MOTOR AGE would be doing a good work if it placed on every page of every issue, in bold type, the words, "Adjust Your Pushrods." I have been called to look at scores and scores of cars which, according to the owners, were not delivering the power they should. These owners professed to have examined everything with a fine-toothed comb and allowed they were completely mystified.

After I had examined a dozen or so, I learned to look to one thing first of all, and that was the adjustment of the pushrods. A man will spend hours doping his engine with carbon remover and adjusting his carbureter to hair-line precision and will start up the street with a clattering set of pushrods that reduces the engine power sometimes as much as 50 percent.

When a valve stem is not just such a distance from the valve lifter, the valve either does not open enough or stays open all the time. Generally it does not open enough. A matter of .010 in. in the lift of the valve makes a world of difference in the power. You simply cannot set them by guess and get a good job. You're not a good enough guesser.

You should provide yourself with a valve-clearance gage, which should be about .004 in. thick. If this cannot be had, use a calling card. Calling cards range in thickness from .0035 to .0045 in. and that is close enough to give a satisfactory adjustment. The calling card or gage should be just a loose fit between the lifter and the stem, touching both parts. Do not draw it down to a tight fit so that it takes a vigorous pull to remove the card or gage. There can be a difference of .001 in. or over by tightening down too much. Adjust every valve the same.

6 Of course, the proper care for the clutch depends entirely on the kind of a clutch you have, whether a multiple-disk, a cone or a dry disk. It is well to say here that a clutch in a car which has been built within the last 2 or 3 years is more or less everlasting and trouble proof. Then, too, the driving public is gradually learning the value of handling a clutch with care. By sad experience they have found the woes in allowing a clutch to slip and jerk and they are handling them more silkily. If you are one of the old-timers that abuses a clutch, stop it. You don't wind your watch with a pair of pliers.

The cone clutch should be examined carefully. If the leather is burned down excessively thin it should be replaced. If the leather is still plenty thick, but is crusted with a charred and dirty looking surface, apply a liberal dose of neatsfoot oil and let this soak in. Then, if the clutch slips you

can insert a dose of Fuller's earth or powdered sulphur.

If you have a dry-disk clutch, about the only thing you can find wrong would be the disks themselves, and this is not likely. If the disks are worn down and shiny you should put in new ones, because these badly worn disks will never carry you through the season, and now is the time to make replacements instead of on some sunshiny summer afternoon when you ought to be touring in the country. The same is true of the multiple-disk clutch. An overnight kerosene bath is a good prescription for this type. In the evening jack up a rear wheel, throw the car in gear and, with engine running, let the clutch in and out until the kerosene has squeezed all through the plates. Then, in the morning, drain the oil out and, if it is the oil-bath type, insert a half pint or so of light lubricating oil.

7 The gearset should receive much the same treatment as the disk clutch. Wash out all the grease with kerosene. Be sure that you get it out of the gear teeth. A grease gun filled with kerosene will help in forcing out the gummy oil. Dry the case, thoroughly, after the bath, and insert clean oil. If you are tempted to fill the gearset case with hard grease, you had better read your instruction book or communicate with the factory or a service station first. There are not very many gearsets made which are adapted to the use of hard grease, and a good many of them can be ruined by its use.

The majority of gearsets are made with no adjustment to the bearings. It is a very infrequent occurrence when a gearset bearing becomes loose and then it can generally be attributed to carelessness on the part of the owner in failing to keep the gearbox full of oil. It is well to ascertain, however, whether things are loose, and this can be done by endeavoring to push the shaft which connects the gearset with the rear axle back and forth. If there is any play over a very slight movement the bearings need adjustment, if possible, or replacement if no adjustment is provided.

8 Friend Car Owner, would that you would learn the absolute need of caring for the universals. These devices are such inoffensive looking things that they are slighted and left to suffer alone, like the wall flower at the village dance. Most universals need oiling every month, some of them two or three times a season, and some of them, of the non-lubricating type, need no care at all. Find out what kind you have. If the universal is of the inclosed type, the shell should be removed, the pins taken out and everything cleaned. If there is a looseness in the bearings by all means put in new bushings, or return the universal to the makers and have it repaired. Wash everything out, and fill it with hard grease. Fill it. Don't just put a dab in. Grease is cheaper than universals.

9 The differential needs its spring cleaning as well as the other driving units. The kerosene flush is equally serviceable here. When you are ready to put in new lubricant, scratch your head a bit and reason it out whether you should use hard grease or flowing oil. There is a very small amount of heat generated in the differential. If you pack in a lot of hard grease the gears are going to cut a path in this grease and run dry. When the heat generated by these dry gears is sufficient it will soften the grease and the gears will again get some lubricant. But this hit and miss oiling is not good for the gears. Use a heavy flowing oil or a light fibrous grease or grease and graphite combination, which you are sure will find its way into the gear teeth.

Bevel gears require occasional adjustment. There are so many different means for making these adjustments in the different makes that we cannot give you any rule that will apply to all of them. If the bevel gears are noisy, this noise can probably be taken up with the adjustment, although it is possible that the gears are worn, or even improperly cut or misaligned in the first place, so that replacement may have to be resorted to if you want your gears quiet.

The adjustment of bevel drive gears is a compromise. When a car is being driven by the power of the engine, there is a tendency for the gear teeth to separate, to push themselves out from one another. Then when the car is coasting or the brakes are applied, the effect is the exact opposite. Therefore, the gears must be set so that there will be minimum noise, both when driving under power and when coasting. It is a thing to experiment with and you may have to make a number of different settings to get the desired results. You can rest assured that the setting which you find before the adjusting operation is started is not far from right, and it is unwise to make any radical changes. Move the gears a little out and try them. If there is excessive noise when coasting they are too far in. If there is too much noise when under power they are too far out. By this method of cutting and trying you will not find great difficulty in getting the proper adjustment.

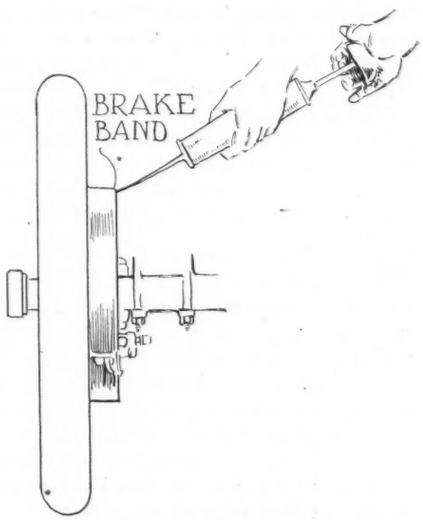


Fig. 7—If the brake bands are gummy with oil, squirt in some kerosene with a grease gun and then add a little Fuller's earth

10 Test the wheel bearings, front and rear. A good way to do this is to grasp the tires on the top edge with both hands and rock them vigorously in and out. If there is a thumping sensation the bearings are loose. Here is the way to set them:

Remove the hub caps and take the cotters out of the cone nuts. Turn up these cones until they are as tight as they will go, without applying great pressure on the wrench. Then turn them out again slowly, the while spinning the wheel with your other hand. At the point where the wheel just spins free, that is, so that it will rotate

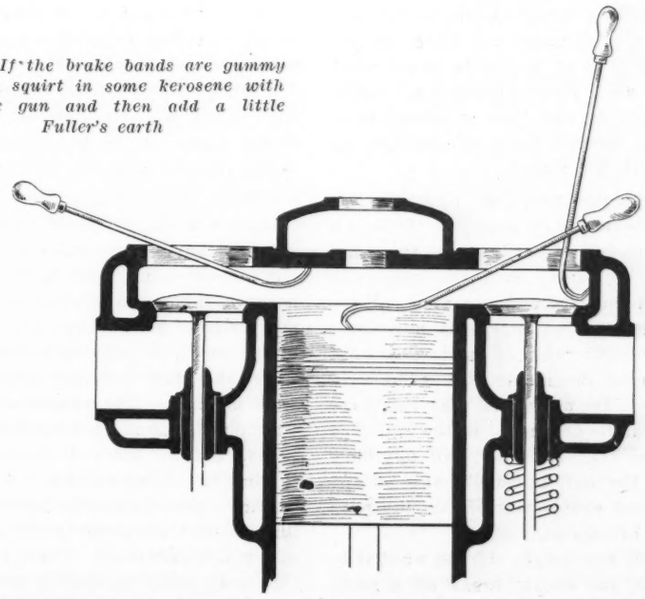


Fig. 8—These are the three kinds of carbon scrapers generally used. Each is shaped to reach various points.

without drag, the adjustment is correct. Do not forget under any circumstances to replace the cotter pins. They are an important part of this adjustment and without them a few miles of driving may mean a seized bearing and a general shredding of the internals of the wheel.

11 The brakes must be adjusted so that there will be an equal pressure applied to each side. On all modern cars is found an equalizing system which is as dangerous as it is useful. Owners get the impression that equalizers will take care of any irregularity of brake adjustment. But such is not the case. You should turn up the turn buckles or tighten the cables, whatever the construction may be, until all brakes are as equally adjusted as you know how to make them. Then set the brake pedal or lever as tight as you can without there being a drag on the brakes. It is well to start the season with as close an adjustment as possible, and it may be that you will not have to touch the brakes again during an entire season.

The way to test the setting is to put the rear wheels up on jacks. Have someone else handle the driving, or do it yourself and have someone else watch the brakes. Get the wheels spinning and throw out the clutch. The service brake should be applied easily. If one wheel stops rotating more quickly than the other, the loose one needs a tighter setting. This operation should be repeated until both sides of the service and emergency brakes take hold at the same time.

12 It is to be hoped that, when you put your car up for the winter you washed all the grease off the tires. Grease is one of the greatest enemies of rubber. If you left the grease on, wash it off now. Use gasoline, and use it liberally until the tires are clean and white all over.

Now go over the tire surface carefully. If you find a cut, no matter how small, even an abrasion, this injury should be treated. There are a good many cut fillers on the market, and it is up to you to select what you wish to use. These cut fillers are really nothing more or less than a rubber compound in a doughy form which may be kneaded with the fingers.

Before applying the filler, clean the cut out very carefully with gasoline. If it is a deep cut and full of sand, scrape this sand out, grain by grain, with the end of a match or the pointed end of a stick. Have plenty of daylight on your work and don't overlook a single grain of sand. The next step is to coat the inside of the cut with tire cement. Do not think that you have to have a puddle of cement in the cut. Too much means that the filler will not bury itself into the cut, but will hang on the cement. Coat every part of the cut with a thin coat of cement.

Then apply the dough. If you want it to work easily, you should break off a piece of dough about the size to fill the hole and hold it in the palm of your hand until the warmth has softened it. Remember when you were a kid in school, you used to buy those kneading erasers and, when the teacher was not looking you used to form them into all manner of sculptury? You used to hold the eraser in the palm of your hand to soften it before you started your masterpiece. It's the same principle with the tire-cut filler. Work this filler into the cut carefully, and with plenty of pressure. It is well to form the filler to resemble the shape of the cut as closely as possible before putting it in so that every crevice will be filled. The longer you take at this job the better the results will be. Knead it until the cement has become thoroughly hardened.

13 It is our assumption that you have got the chassis and running gear in serviceable condition. Your labors have been more or less accompanied by a general spattering of grease, and your gloves, or hands maybe, have touched about every part of the chassis and left a spot of grease thereon. If this grease is allowed to remain it will serve as a great dust catcher. You should go over everything with gasoline.

Gasoline is selling high right now, just like everything else, and there is no need of being reckless with it in cleaning the chassis. A gallon ought to be more than enough to do the whole job. When you dip your rag into the gasoline and remove it, hold it over the can and give it a little squeeze so that it will hold what gasoline is in it, and not spill it all over the floor.

14 The body should be thoroughly and carefully cleaned. You must bear in mind that very small particles of grit, so small that your eye will not notice them, will put an ugly scratch in the body if rubbed across it. Therefore, determine that you will clean and wash the rags you use very frequently while doing the body scrubbing. A good cleaner is a soap which is put up by a number of different makers, which is either lathered on or coated on and allowed to dry and then rubbed off.

A hose washing with a sponging down with soapy water is also effective. Keep things clean. Wash the sponge out often. Wash out and ring out the rags often. It is worth while.

Once washed the body should be dried with a chamois or with very soft cloth. Here again cleanliness must be observed because the washing does not always remove all the grit. Now, for the polishing. There are liquid polishes and solid polishes. The wax polish is a very good and permanent medium. The proper application of wax polish takes an abundance of elbow grease, and the more elbow grease you use, the better the job will be.

There are liquid polishes which are dabbed on with cloth in the same manner you polish furniture. Then, too, there are the spray polishing outfits, with which you spray liquid onto the body like you spray fruit trees. You may have tried out the various types already and settled upon some one which you think gives the best results.

15 If the body has become scratched, if the paint has chipped off, if parts have become exposed and rusted, these should by all means be retouched before starting into the driving season. There are several good retouching compounds on the market. A quick-drying enamel is a good thing to use, because it flows evenly and, once applied, it is hard to detect where the retouching has been done. Do this job carefully. Don't plaster the paint around where it does not belong. Use a pointed brush so that you will cover only the area which needs covering.

16 A season's use of a top, especially if it has been carelessly handled, has brought about some disruptions in the fabric which will end in a wrecked and unsightly top, if not promptly taken care of. If there are any tears in the fabric sew them up or have someone that knows how sew them up. If the top is discolored and inclined to be brittle, go over it with a top dressing, and let the dressing soak in. This is a good thing to do regardless of the condition of the top. In fact, I advocate it for use on new cars. When you buy a pair of shoes, the first thing you do before you go out into the wet is to have them shined. Do the same thing with the top. Preserve it with a good dressing.

17 Those side curtains have probably been kicking around in a dusty tool box, and the sight of them staggers you. It is an easy matter, however, to get them back into shape again. Go over the fabric with top dressing, first having washed it with soap and water. If the lights are broken, put in new ones. There are several companies offering curtain lights for any make of car. If they are just dirty and stained, clean off the mica with a weak solution of vinegar.

18 Now that the job is all done, look it all over again. Go over everything that you have worked on. Make sure that you have omitted no bolts, nuts or cotter pins. Examine the now dry body carefully and see that there are no spots you have missed. Try to make it a new car. Don't leave anything undone.

19 You have now read this story. Or maybe you have taken our suggestion and turned to the numbers you were interested in, and this paragraph, No. 19, is the first one you have read. If it is, I say, start back and read the rest of it. Then take this MOTOR AGE issue to the garage or workshop and go through the overhauling with the story before you.

20 This is the last paragraph. You have read the story and you turn over the page to something else. Put a marker in page 5 and then when you have gone through the whole issue, turn back to that marker. If you don't go out and fix up that car you are going to feel guilty. Do it—by all means.

To Make Palmer Tire

New Company Will Manufacture Latest Development of Cord Idea Inventor

Controls Patents on Automatic Machinery and New Type

CHICAGO, March 5—John F. Palmer, Riverside, Ill., inventor of the cord idea in pneumatic tires, has organized a company for the manufacture of his latest development in this type of tire. The factory is at St. Joseph, Mich., has 70,000 sq. ft. area and is of modern construction. The concern is called the Palmer Tire & Rubber Co. and will manufacture the Palmer flat, cable, cord tire, a new development of the cord construction. A new tube of Palmer design also will be made. Mr. Palmer's twenty-three years of experience in this field promise interesting construction. The company is capitalized at $500,000, and the officers are as follows: J. F. Palmer, president; C. W. Bully, Chicago, vice-president; W. E. Bryan, Chicago, secretary; Marshall D. Wilbur, treasurer. G. H. Bird, of the Bird-Sykes Co., Paige distributor, Chicago, is manager of salesmen.

G. W. Bully was formerly president of the Mercury Mfg. Co., Chicago, and recently resigned from that company to take charge of the manufacturing department of the new factory. Mr. Palmer controls the patents on his new type of cord tire and also patents on the automatic machinery for its manufacture. A complete description of the new tire will be published in an early issue.

RESIGNS FROM WILLYS-OVERLAND

Toledo, Ohio, March 2—H. T. Dunn, vice-president of the Willys-Overland Co., has resigned, his resignation to take effect May 1. His withdrawal is due to the increases in business and plans for development of the Fisk Rubber Co. and the Federal Rubber Co. Mr. Dunn is president of the two rubber companies and finds it necessary to devote his time to them. He will remain a director of the Willys-Overland Co.

1000 AIRPLANES YEARLY

Detroit, March 3—A group of Detroit inventors, working in conjunction with T. W. Benoist of the Benoist Aeroplane Co. of Sandusky, Ohio, are planning the organization of a company in Detroit to manufacture aeroplanes on a large scale. The Detroiters interested are P. W. Murphy, S. Smith and S. Peplenski, expert mechanics employed in various motor car factories.

The Benoist company is the second largest in America, being surpassed in output only by the Curtiss company. The plan is to combine the Benoist aeroplane specifications with a new 18-cylinder, cam drive, 120-hp. engine developed by the Detroit men. It is hoped to make at least 1000 planes a year in the Detroit factory. The new planes will carry from two to eight passengers and sell at prices ranging from $5,000 to $11,000. If the company can be organized within the next month and a plant built in time, it may compete for a part of the Government business incidental to aeronautic preparedness. The company also plans to operate the passenger and mail transportation system between Detroit and Cedar Point.

FORD SHIPS TRACTORS

Detroit, March 2—Two tractor plows have been sent to England by the Ford Motor Co. as an experiment. It has been reported that this tractor plow can turn over about 6 acres of soil in 8 hrs. A recent news dispatch from England states that, according to Sir Arthur Lee, director general of food production, England will import 2000 American tractor plows soon.

AUTO PARTS RE-ORGANIZED

Chicago, March 2—The Auto Parts Co., Chicago, has been reorganized and new capital brought in. The new list of officers includes A. H. Skogland, president; F. D. Symonds, first vice-president; J. B. Couleur, second vice-president; H. W. Binnie, treasurer; A. C. Johnson, secretary; G. G. Schoneberger, general manager. R. M. Symonds, the former presilent, sold his interest.

FISK RAISES PRICES

Chicopee Falls, Mass., March 2—The Fisk Rubber Co. has announced an increase of 10 per cent in the price of its tires. A general tire price increase has been pending for more than a month and other increases are expected. Most of the companies raised tire prices from 10 to 15 per cent Jan. 1.

GOODRICH TIRES HIGHER

New York, March 5—Moderate increases in tire prices have been put into effect by the B. F. Goodrich Co., Akron, Ohio. With the announcement that Fisk prices were to advance, made last week, a general rise was expected all along the line. Interviews with the New York offices of the major tire manufacturers today revealed that no sharp rise in prices is likely at the present time.

The Goodrich schedule on casings is now $11.65 for the 30 by 3, formerly $11.35; $15.10 for the 30 by 3½, formerly $14.70; no increase in the $17.70 price for the 32 by 3½; $25.30 for the 34 by 4, formerly $24.60; $36.25 for the 36 by 4½, formerly $34.20.

A slight increase was also made on the tubes which are now priced at: $2.75 for the 30 by 3, formerly $2.70; $3.40 for the 30 by 3½, formerly $3.05; $3.50 on the 32 by 3½, formerly $3.40; $4.70 on the 34 by 4, formerly $4.25; $6.05 on the 36 by 4½, formerly $5.60.

Cooper Wins at Ascot

Sweepstakes Run in Los Angeles Proves Another Cooper-Pullen Battle

Disabled Frontenac Prevents Rickenbacher Trying Course Record

LOS ANGELES, Cal., March 4—Special telegram—The belated George Washington sweepstakes run at Ascot speedway today was another Cooper-Pullen battle which has become rather chronic on the local speedway. Cooper in a Stutz finished the 100 miles in 1 hr. 27 min. and 46 sec., his average being 68.35. Pullen's Mercer was second, the time being 1 hr., 28 min., and 18 sec., and Toft was third, time, 1 hr. 30 min. and 38 sec. Pullen's average was 67.95 and Toft's 66.19 m.p.h. Cooper won $3,000 of the $5,000 prize.

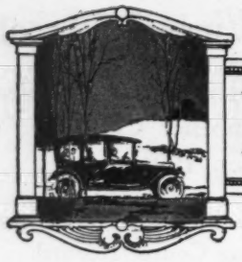
Among the 20,000 spectators were many who expected great things of Joe Boyer and his Frontenac, which had been heralded as speedy. The Frontenac had the pole and led the field at the beginning, but was soon displaced by Cooper and went out at 20 miles with a broken wrist pin. Boyer almost wrecked the car in practice a few days before the race and a new set of pistons was installed immediately before the race began, which gave him no opportunity for working them out.

The field originally numbered twelve starters, but one driver was excused because of injury to his eye. Cooper set the pace and took things easy up to the twenty-eighth lap. Pullen blew a tire while driving high on the curve and while stopping at the pits to change, Toft went into second place, but by the end of forty laps the Mercer was second again, the Durant was third. In the fifty-ninth lap, Cooper changed three tires, Pullen going to the lead but losing it again two laps later when he had to stop for tires. At this point Cooper again took the lead and kept it to the finish.

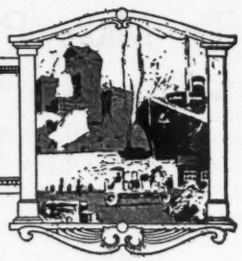
Eddie Rickenbacher was billed to attempt to break the course record of 45 sec., set by Oldfield in a Christie. He expected to use the Frontenac, but since this car was disabled the event was canceled. The cyclecar race which opened the program was won by Morgan Snyder in 12 min. and 28 sec. The final Ascot race of the winter season will be run March 25.

ITALIAN RACE DRIVER KILLED

Turin, Italy, Feb. 5—Giovanni Marsaglia, motor car engineer and race driver, was killed yesterday while making a trial flight as passenger aboard an Italian army aeroplane. The machine was a new type carrying a motor for which Marsaglia was partly responsible. On coming to the ground after a height test the machine got out of control and fell a complete wreck.



EDITORIAL PERSPECTIVES



The Season of Cleanliness

EVERY 24 hours, or oftener, you go through the process of a physical cleanup, the shower and the general bodily renovation. Make the 24 hour period a 365 day period and make your physical self your car and there you have it. That car needs its periodical cleanup just as much as you do. It is all right to wash its hands and face four or five times a season, but at least once a year it should have a thorough in-and-out renovation.

THE proper time for the general cleanup is in the spring. If the car has been stored all winter it is stiff in its joints and sodden in its bearings. Its body may be encrusted with the accumulations of a winter's dirt. If the car has been driven all winter it has received only that care which chilled hands and an icy disposition would permit. Reaching home from town, benumbed and stiff, you have let that bearing squeak, rather than get out an oil can with your frigid hands.

WINTER driving is one of short trips. The car gets out of the habit of long-distance work, bolts loosen, springs squeak, the tires have been slashed by the icy roads. Starting into a vigorous touring season with such a shaky piece of mechanism is suicide for tires, comfort and the pocketbook. Unless there is something radically wrong with the internals of a motor car, the average man can with a due amount of patience, perform every operation which will put it in first class endition.

GRINDING valves is not a difficult task. Removing carbon from the cylinders is not a difficult task. It requires no amount of mechanical skill to re-oil working parts, adjust brakes and wheel bearings. It requires nothing more than painstaking care and a good deal of perseverance to make the old body look almost like new.

THE accessory makers are doing everything in their power to make things easy for you. They are putting up complete sets for the repainting of your car. All you have to do is to buy one of these sets, locate your car in a place free from dust; open the case and go ahead with the work. All of the material is there. They are mixing your valve grinding compounds for you, saving the inconvenience of doing it yourself. They are offering you valve-grinding tools that minimize manual labor to a surprising extent.

THINK of this satisfaction of having a bright, tight and clean car to start the season, and then, before the thought leaves your head, get busy. The man that puts it off now is the one that will not do it at all. The atmosphere of spring has a sort of depressing effect on ambition, you know, and if you wait until then you will never clean up. The air is still crisp. Get busy!

Wanted—Permanent Roads

"GOOD ROADS" has become a slogan, but it is sadly in need of revamping. What we need is not good roads, but BEST roads! Why should a county, state or the nation throw money away on highway construction that has not the rudiments of good business; spend money for roads that soon are rutted, the surface washed into the ditch, and that last but a season or two at the most? Our whole system of roads, with the exception of an almost insignificant fractional part, is inadequate. If the Romans and Napoleon had built roads like we build them in this country, would they have withstood the strain of ages and been a monument to Italy and France that they are to-day?

HAD it not been for the advent of motor cars it is difficult to imagine what the roads of this country would be today. More motor cars are coming, and more commercial vehicles. The wise manufacturer in laying out a plant makes provision for expansion. Are the road-builders of the country far-sighted enough to build roads that will have a permanent character, so that when traffic increases, as it is and will be doing every year, the roads will be adequate? We do not need to have roads laid out like a railroad grade, that is, less money need be spent for grading and filling; but we do need a surface that will be permanently hard and require very little maintenance. Present-day vehicles can negotiate an undulating road, it gives more pleasure to ride over such a road, and there should be no objection to moderate grades.

ONE county in California has spent $17,000,000 for permanent roads—in this instance, cement. It probably is out of the question for all counties to do likewise, but if we are to put money into roads at all, then we should make the trunk lines of a permanent character. Ultimately, great motorized transportation routes will be necessary, and we should have the right kind of highways to handle this class of traffic. The need is for year-around main roads; not gravel roads, not macadam roads, not dry-weather roads, but permanent, hard-surfaced roads that will not be impassable in wet weather. Not only will such roads be an asset to peaceful pursuits of commerce, but they would be of great strategic value if this country should be at war with other nations.

ROADS are the nerves which bind the country together and the condition of these roads reflects the strength or weakness of this bond between communities. Roads into a city help the city business man. It is the duty of the business men who benefit to put something back on the roads. Owners of city lots share the expense of paving the street at so much a front foot. Why should not the farmer pay a given sum per front foot to build permanent roads that will enhance the value of his land?

Where Will We Park?

IN THE larger cities the parking problem during the last season has been responsible for depriving thousands of urban tourists of the use of their cars. They have found it impossible oftentimes to find a place to leave the car during business hours that even approached a convenient distance from their work. Only the early birds were fortunate enough to find space for parking at the curb without the dangerous and vexatious negotiation of blocks of congested traffic. They have preferred the city transportation systems. Chicago and one or two other cities have provided municipal parking spaces, but there cannot be enough of these to have one convenient to more than a fraction of those who might use it.

THIS year conditions will be worse. Motoring organizations and traffic officials are wrestling with the problem. Congestion of traffic on the busy streets will force the cities to decrease the space allowed for curb parking. Where will we park our cars?

Driver's License for Visitors

Arizona Proposes Law to Make Non-Resident Tourist Pass Examination

PHOENIX, Ariz., March 3—According to a bill being considered in Arizona, all tourists would have to obtain a driver's license before crossing the border or be liable to arrest for breaking the law.

A license tax for motor cars based on the weight of the car, non-transferable licenses for all drivers, examination of chauffeurs by a mechanician and the county physician before issuance of a license to drive, and a reciprocity arrangement as regards the life of licenses of cars from other states are some of the features of the motor vehicle code introduced in the legislature. The bill, which combines several features from the motor vehicle codes of other states, was compiled by Con P. Cronin, state law and legislative reference librarian.

Weight Would Determine Tax

The license tax for all cars would be at the rate of 50 cents a 100 lbs., the weight of the car to be taken as delivered by the manufacturer. Trucks would be charged for at the same rate, with an additional charge of 50 cents for each 100 lbs. carrying capacity. Jitney buses and stage line motor cars would pay a license tax at the rate of $1 a 100 lbs.

Another change in the license tax is that it is to be computed on a monthly basis; that is, the owner of a car shall pay the license tax for the actual number of months for which the license is issued and not for a longer period. Under the present law license charges are either for the entire year or, after July 1, for six months. Under the new law the purchaser of a car Dec. 1 need pay only one month's fee for the remainder of the year instead of six months' license as at present.

Two provisions in the proposed code are intended to make it extremely difficult for the thief to operate. One is the general driver's license, which when issued is non-transferable; another is the provision making it a felony punishable by $300 fine and 1 year's imprisonment to alter or destroy the manufacturer's serial number or any other distinguishing number or mark. No driver's license is to be issued to any person under 16 years of age, the bill provides. It is this general driver's license that would affect the tourists.

RECIPROCITY IN A TANGLE

Trenton, N. J., March 3—Because the roads of New Jersey are used by motorists from other states in a proportion to Jerseymen's use of the highways of these other commonwealths greater than 100 to 1, the Garden State has decided to have and enforce what is probably the most comprehensive set of motor vehicle laws in existence.

NEW JERSEY RECIPROCITY

What Law Says

The Jersey laws provide that motor vehicles from states granting reciprocal privileges may be driven in New Jersey "during a period not to exceed 15 days in each calendar year, or on two or more occasions not exceeding in the aggregate the period of 15 days in any such year," without obtaining a Jersey license for car or driver; and that "each day or part of a day . . . shall be considered as one of said 15 days."

ARIZONA MAY SEARCH TOURISTS

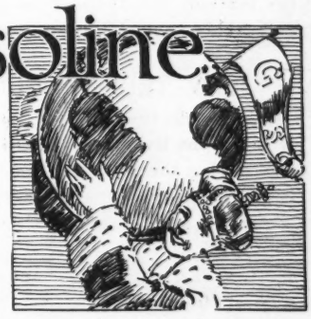
Phoenix, Ariz., March 2—Motorists desiring to cross Arizona may be stopped and searched at the state line to prevent their bringing any intoxicating liquor into the state, if a bill introduced in the legislature becomes a law. The measure, which creates a state police force to patrol the roads, is designed as a prohibition measure and has the united support of the temperance forces. There would be twenty rangers, commissioned by the governor and acting under orders from the captain of the state police. The bill has been reported favorably in the lower house, and there is every indication that it will become a law. In case it does, woe to the tourist who has anything "on his hip" or, worse yet, tucked away under the seat of his car. But to the law-abiding motorists the state police, it is pointed out, would often render invaluable aid, not only by assisting him in case of accidents but in directing him as to the best route.

MOTORISTS TO HAVE WIRELESS

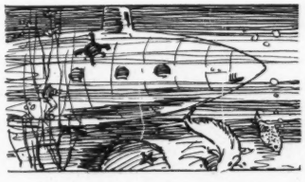
New York, March 3—The American Automobile Association has announced the perfection of a wireless telephone which can be used on motor cars whether they are standing still or running 50 m.p.h. The device is designed for motorists who may plan trips into such territory as the American desert and want to be prepared to summon help should they get into trouble.

The Kick in Gasoline

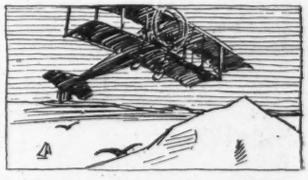
by Lou E. Cole



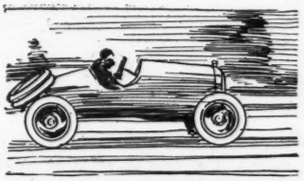
The King of Kings on the earth today,
Without question, or doubt, am I.
O'er land and sea, I hold full sway,
And shall, as long as the milky-way
Can be traced in the starlit sky.



I prowl the caverns, deep and dark,
With a quivering hull of steel;
Light up the gloom with a radiant spark
That charms the eye of the startled shark
As he slips by the metal keel.



I drive the eagle from his cliff,
Through the clouds, on wings of fear;
The gull from its haunts in the rocky rift,
And laugh, as they dodge, turn, wheel and shift
To escape when I'm drawing near.



I am the life, the breath, indeed,
Of the strong and swift machine
That takes the place of the halting steed,
On my whirring wheels of matchless speed;
Me? I'm the KICK in Gasolene.

France Establishes Tractor School

Move Is to Aid Food Shortage in Country Caused by Labor Shortage

PARIS, Feb. 10—The first state agricultural motor school has just been established on a 320-acre farm near Paris, given for that purpose by Madame Gomel-Pujos. The school, which is under the direct control of and maintained by the French government, aims at forming specialists who can handle and care for agricultural motor machinery, and particularly agricultural tractors. Only Frenchmen and foreigners of allied nations are allowed to enter the school, either pupils or masters.

Private agricultural motor schools have been established at Chartres and Le Mans, and are particularly interested in giving a special training to men wounded in the war, so as to make them capable agricultural-mechanics. Vigorous efforts are being made at the present time to extend the use of motor tractors in all the agricultural districts of France, in order to meet the food shortage caused by lack of labor. It is estimated that 400 to 500 tractors are now in service, and a generally accepted estimate is that 30,000 to 40,000 might be used with advantage at an early date. The only tractors now available are those of American origin, and these are being bought readily. Agricultural interests are concerned in getting French tractors on the market, but there is no possibility of doing this until after the war.

ARMY TRUCKS HAUL COAL

Paris, Feb. 10—Motor trucks undoubtedly saved the lives of hundreds of Parisians who during the recent severe weather were without coal and unable to secure further supplies. All the coal dealers' stocks had become exhausted, owing to the stoppage of supplies up the river Seine, and the only coal available was in the reserve depots of the city of Paris. It was impossible, however, to distribute it to the various quarters of the city and suburbs, owing to the absence of men and horses. It was at this critical point that the military authorities decided to place 1800 army trucks, about half of them being American trucks, at the disposal of the city for the haulage of coal to local dealers.

RECEIVER FOR ENGER

Cincinnati, Ohio, March 5—L. J. Dauner has been appointed receiver for the Enger Motor Car Co. and has been authorized temporarily to continue the business. Mr. Enger's widow testified that the assets of the company were $240,000, while the undisputed liabilities were $22,000 with disputed liabilities amounting to $80,000.

MILBURN RATE CASE POINT

Toledo, Ohio, March 1—The Interstate Commerce Commission yesterday ruled in favor of the Milburn Wagon Works in the rate case pending two years. The Milburn company protested against proposed increase in freight rates on the Lake Shore railroad, the rates pertaining to through shipments of vehicles loaded on cars, and an order was issued yesterday following hearings by a representative of the Interstate Commerce Commission, holding proposed increases in abeyance pending final action of the commission.

TIRE TRIAL THIS WEEK

Akron, Ohio, March 5—The suit of F. A. Seiberling and the Goodyear Tire & Rubber Co. against the Firestone Tire & Rubber Co. will be held on appeal in the U. S. Court of Appeals at Cincinnati this week. Hundreds of thousands of dollars in royalties are involved.

Seiberling and the Goodyear company won a decision in the U. S. District Court in Cleveland, Goodyear establishing its contention that the invention of a machine to build tires, replacing hand-made tires was a pioneer invention and that no other company could build machine tires without arranging with the plaintiffs.

The Firestone Tire & Rubber Co. has a machine of its invention and is carrying an appeal on the ground that its type of machine is not of patent infringement.

SELLS TRAILER INTERESTS

Beloit, Wis., March 3—James Menhall, vice-president of the Warner Mfg. Co., maker of the Warner Auto Trailer, has sold his holdings to A. P. Warner, who becomes sole owner by the deal.

PILOT PRICES ADVANCE

Richmond, Ind., March 3—The Pilot Motor Car Co., Richmond, Ind., has announced an increase of $50 in the price of its 6-45 model, effective April 1. The new price applies to the five-passenger touring and four-passenger roadster types.

JACKSON PRICES HIGHER

Jackson, Mich., March 1—The Jackson Automobile Co. has increased its prices $100 on all models, except the sedan, which remains at $1,995. The two-passenger model now sells at $1,395; the five-passenger at $1,395; the seven-passenger at $1,495; and the detachable top model at $1,605.

CHICAGO SERVICE MEN ORGANIZE

Chicago, March 1—That the method employed by one service manager may help another to solve his problems is the reason behind the proposed formation of a service managers' organization, tentative plans for which were made to-night at the local headquarters of the Mitchell agency. Twenty-five service men, coming from the service departments of Mitchell, Chandler, Mercer, Hupmobile, Chalmers, Premier, HAL-Twelve, Overland, Cadillac, Jeffery, Haynes, Arthur Jones Electric Co., Vesta Accumulator Co., Pellets Magneto Exchange and Motor Car Service Co., attended to-night and plans were made for

The army truck in Europe has proved itself a vehicle of parts many times over. For instance, here is a White army truck hauling coal from the Paris reserve depots to dealers. The authorities placed 1800 trucks in this service and are said to have saved thousands of lives by doing so

another meeting and dinner at the Hotel Metropole, March 15, when further details will be taken up and officers elected.

The meeting to-night was of the round-table variety, each man explaining some phase of service. It was evident that there is great need for an intermingling of service managers since it was not until toward the end of the meeting that these men warmed up and got into the speaking spirit.

Such questions were brought up as checking in owners' car to insure the company against loss of tools, robes, etc; taking down speedometer readings on every car entering the station to insure the company against unscrupulous owners bringing cars back after an overhauling and declaring the car had not been run but the work had not given satisfaction; taking serial numbers of cars to aid in locating stolen vehicles; requiring mechanics to assume responsibility for tools lost; and the extent to which testers are liable for damage to owners' cars while having them out on the streets.

It was asserted at the meeting that the repairmen are organizing as a branch of the machinists' union and that some 300 are to be initiated next Tuesday. A demand, it is understood, will be made for 62 cents an hour the first year and 68 cents the second year. Distributors look for some difficulty to arise from this scale of wages in the early spring.

DENEEN PLANS EXPANSION

Cleveland, Ohio, March 2—The Deneen Motor Co. of this city has purchased nineteen acres of land, upon which it will erect a large and thoroughly equipped factory to be operated in addition to the present plant. The company has introduced a new ¾ truck and soon will announce two others.

Twenty-Two Makes at Boston Salon

Rolls-Royce Is Only Foreign Car Among the Exhibits at Copley-Plaza Hotel

BOSTON, March 5—Boston's Automobile Salon opened this morning and like New York's holds an aggregation of high-class, high-priced cars. It is essentially a style show. It is held in the grand ballroom of the Copley-Plaza hotel and is staged by the Boston Automobile Dealers' Association, which also puts on the exhibition in Mechanics and Horticultural Halls. Chester I. Campbell manages them all.

All told, there are twenty-two different makes of cars on view, and with one exception these are all products of American factories. The exception is the Rolls-Royce.

Following is a list of the cars on view: Brewster, Chandler, Daniels, Disbrow, Fiat, Franklin, HAL, Jeffery, Liberty, Locomobile, Marmon, Mercer, McFarlan, Ohio electric, White, Owen-Magnetic, Pierce-Arrow, Phianna, Rauch & Lang electric, Rolls-Royce, Simplex-Crane, Stearns-Knight.

BEARING SALE CONFIRMED

Philadelphia, Pa., March 3—Judge Thompson of the United States District Court, this city, has confirmed the sale of the assets of the Standard Roller Bearing Co. Under the decree transfer was made of the company's property to a syndicate headed by Frank Smith of Philadelphia.

The purchase price, including creditors' claims and the buying in of outstanding stock, is $2,000,000. Since the decree was filed it has been established definitely that the syndicate is the Marlin Arms Co. of New Haven. The Standard concern will continue to make roller bearings, though MOTOR AGE'S correspondent is informed by Frank Smith that there is a possibility that should war occur it will be turned into a plant for the manufacture of rifles.

The plans are to install new machinery at a cost of $1,000,000 to bring the plant up to its new requirements. This is the plan of A. F. Rockwell, president of the Marlin Arms Co. and head of the reorganized Standard Roller Bearing Co. The deal as finally put through was engineered by S. S. Eveland, former president of the Standard company.

The creditors will receive 60 cents a dollar on the face of their claims. The stockholders will receive $7 a share for their holdings, the par value of which is $50. The licenses under which the company operated, which are held by the Hess-Bright Co. and the Rudge-Whitworth Co., are not assignable and so will continue as the property of the reorganized concern. Judge Thompson's decree is virtually an adoption of the decree handed down by the United States District Court for New Jersey.

FISHER EARNS $639,000

Detroit, March 3—The Fisher Body Corp. from the date of incorporation, Aug. 21, 1916, to Nov. 30, 1916, shows, according to a recent report, a surplus available for common stock for those three months of $639,000, equal to $3.20 a share on 200,000 shares of common stock.

Germany's U-Boat policy has piled freight on New York's docks, with little hope of reaching its destination soon, unless American liners are armed in spite of the Senate's failure to make such provisions. These motor trucks were photographed on the Cunard pier. They, too, are awaiting shipment

AT BOSTON—THE POTATO SHOW

Homely Murphy Helps Make This New England Exhibition the Biggest Ever

By S. P. McMinn

BOSTON, March 3—They're swapping potatoes for motor cars in Maine, and sober, stately Boston is turning slowly but surely from the somber colors to the brighter colors that are found more often on New York's white way and on Chicago's Michigan avenue.

Except that Boston's fifteenth annual exhibition is, as usual, a style show, an exhibition of beautiful bodies and the niceties of the craft, these two features stick up above all others. Potatoes are in the air; brightly colored cars dot the show and help to make it one of the most beautiful Beantown has ever seen.

Also it is the biggest show New England has ever seen. For the first time it has been necessary to requisition another building to hold it. Heretofore it has always been crowded into Mechanic's Hall, but this year there was such a big overflow that the old Horticultural Hall, where Boston's first shows were held, was again put to use.

But the main show—the show where the rail crowd goes, by the way—is in Mechanic's Hall. And just as Sam Miles outmilesed himself in New York, so has Chester Campbell outcampbelled himself in Boston.

The sober black and white effect that last year transformed the big building into a real show place, this year has given way to a riot of color. Judge of it by the high sounding titles which have been given the two halls. One is the "Hall of Jewels;" the other, "Gardens from Other Lands." Neither name is entirely descriptive of the decorations. In Grand Hall the whited figures that stood in the center last year are atop white fences this year and make of the center a place apart; and in the center a wonderful pagoda rears its electric-lighted top to the roof-trees. Great clusters of electrics, every color in the rainbow, are reflected from clusters of crystals as big. Exhibition Hall is a series of gardens; there is an exhibit to a garden, white-fenced and separated from the next by masses of foliage and flowers. Overhead some of the glory of Grand Hall has been borrowed, and string upon string of colored tungstens is reflected from the kind of crystals that hang from the chandeliers in old-fashioned "best rooms."

As usual the Boston show is the most complete show. It has some ninety different brands of pleasure cars, fifty different makes of trucks and 170 accessory exhibitors. A count shows that there are just 519 trucks and cars on the floors of the two buildings.

Most of the cars and trucks already are familiar to the show-going public, though about a dozen makes of cars are new to the Boston show-going public. One car not previously shown is on view.

This is the Napoleon, which is made by the Napoleon Automobile Mfg. Co., Napoleon, Ohio. It is a well-finished, attractive-looking car with a five-passenger body and a wheelbase of 112 in. The engine is a 3½ by 5 Lycoming four with Dyneto starting and lighting system. Other essential elements are a disk clutch, three-speed gearset, Weston-Mott axle and cantilever rear springs. Tires are 31 by 4.

Here is a glimpse of Exhibition Hall, showing the lavish use of foliage which transformed the hall into a veritable flower garden

The Dealers' Mecca

Boston always has been and probably always will be the dealers' Mecca. From all over New England they come. Far away Maine, where the potato farmer holds sway, gives up its quota; not even the perennial and heavy snows of Vermont and New Hampshire keep the dealers at home; Massachusetts and Connecticut dealers flock to the show in droves. Last year more than 3000 dealers from New England territory attended; this year it is estimated that the number will be more than 5000.

Just now the man from Maine is about the most important person at the show. And the word potato is the magic word that opens all doors. They are swapping potatoes for motor cars; potatoes are paying off mortgages; they even gamble for potatoes! One dealer stated that when genial friends get together for a quiet game the stakes are bushels of potatoes.

Just what a furore the homely murphy is making it is impossible to believe. Last year spuds were bringing $1.35 a bushel wholesale, and the farmers were feeding them to the starch mills to get rid of them. This year they are bringing $8 and

$9 a barrel, and the farmers are hoarding them like diamonds. One man has been shipping for two months in small lots; he has 3000 barrels left and frankly states that he is going to hold them for $10.

Still more astonishing is the fact that potato barons are becoming car dealers. P. H. Reed of Fort Fairfield, Me., cleaned up a quarter of a million dollars in potatoes this year. Now he is getting out of the potato field and has contracted to handle Apperson cars.

Potatoes are paying off mortgages that have stood for years. Here is a news despatch printed on the front page of a staid Boston newspaper:

AROOSTOOK POTATO MEN PAY $1,000,000 IN MORTGAGES

Houlton, Me., March 2—According to statistics from the registrar of deeds today, 1150 farmers in Aroostook County have taken advantage of prosperity, induced no doubt by the soaring price of potatoes, and had mortgages against their farms discharged. At least $1,000,000 is involved in these trancastions.

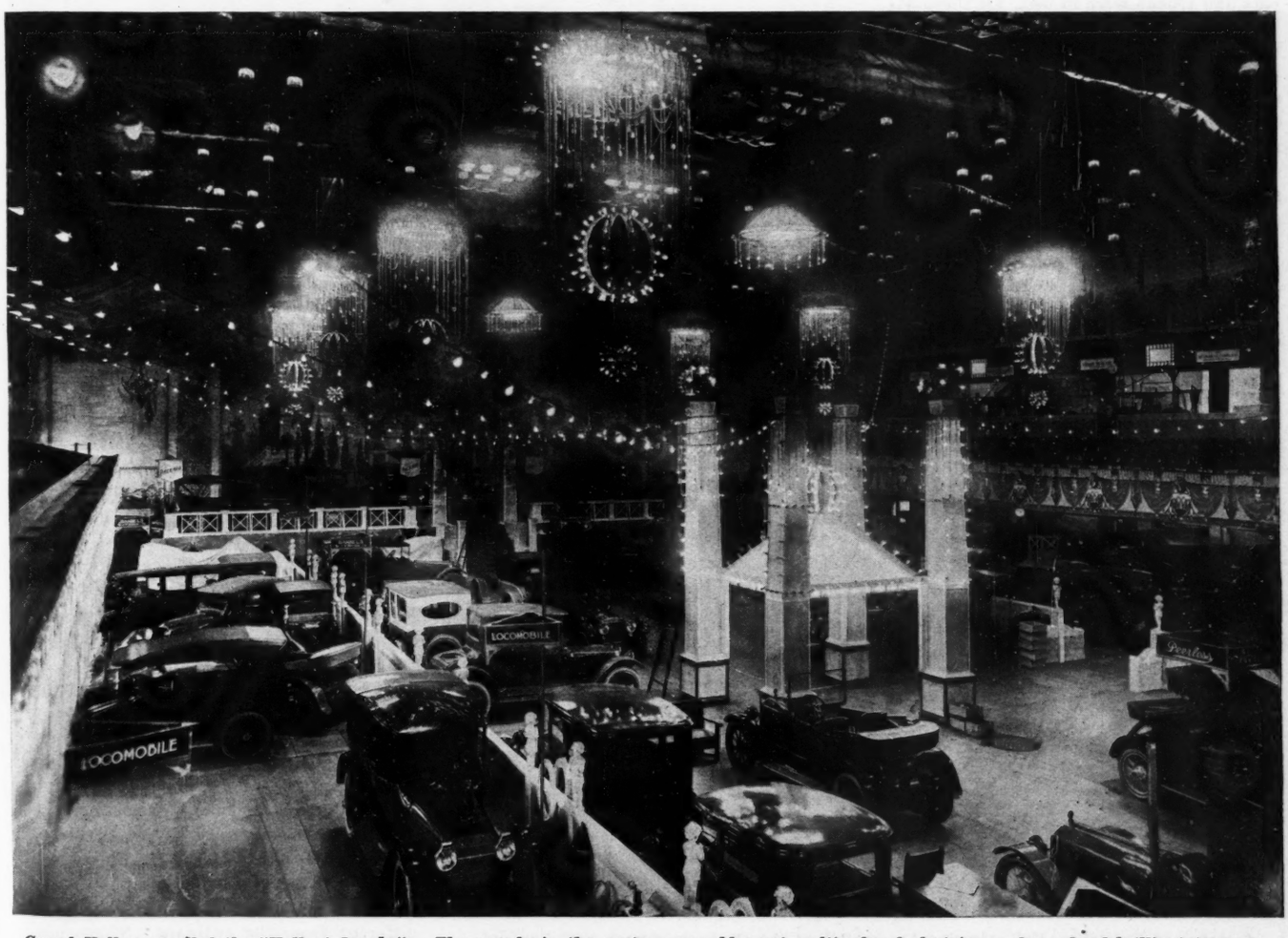
Potatoes have made Aroostook County in Maine the second richest county per capita in the United States. Motor car dealers state that it is becoming common practice for a potato baron to pay for a car with 100 to 150 barrels of potatoes; and the car dealers are glad to get the potatoes.

But not all the wealth of New England is in its potatoes. Munitions, which have piled up immense fortunes during the year gone by, have sold thousands of cars. Tobacco crops throughout Connecticut have been bigger than ever, and tobacco has brought record prices. It is estimated that a 20-acre tobacco farm this year will return enough profit to buy a car, with something left over for extras.

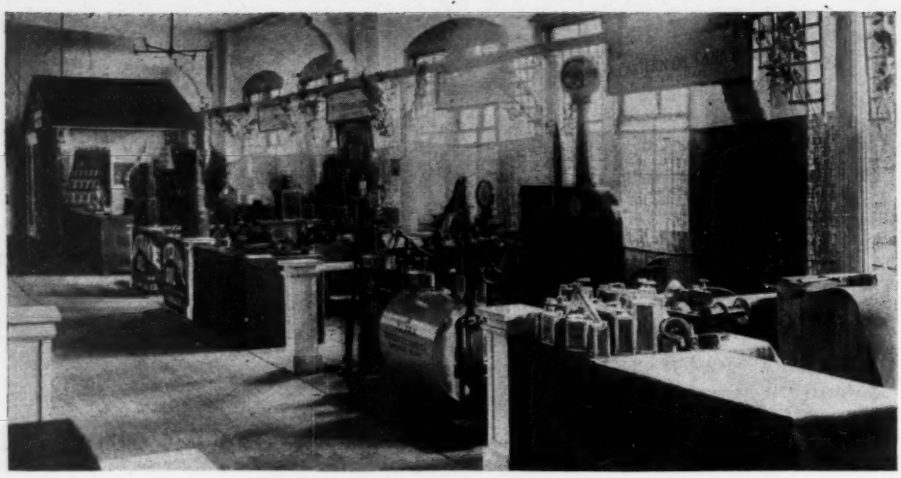
New England's manufacturing centers about its boots and shoes and its textiles. War orders brought immense trade to the boot and shoe industry—so much so that the United States was neglected. Now the plants have to run full time and overtime to supply home demand. And leather has reached new high levels. Wages are higher than they ever were.

The textile mills don't know what a minute's rest is. For months and months they have been running under forced draft. The plants have been so busy, in fact, that operatives have not had time to think about wages and strikes—and strikes always have been a part of the spring program of New

No, this is not a great beetle; nor is it an Overland racing car. This is the way the Overland eight-cylinder Knight chassis was disguised for its trip from the factory to the show. The cover completely covered the chassis and buttoned on like a glove



Grand Hall was called the "Hall of Jewels." The pagoda in the center was a blaze of multi-colored electrics, and overhead brilliant tungstens in every color of the rainbow shed a riot of color on the cars. The stage is in the background



A glimpse of a small section of the accessory exhibition. Flowered trellises were used for decorations

England's textile mills. Everywhere prosperity is the rule. The demand for machine tools has never been greater. Ever since the world war started there has been a premium on skilled labor, and New England is the home of the skilled laborer. So it is no wonder that New England dealers view the future through rose-tinted glasses.

Last year car and truck registrations throughout New England increased 47 per cent. On Jan. 1 a grand total of 272,954 cars and trucks were in use. Of these 241,427 were passenger cars and 31,527 were trucks. During the year 87,591 new registrations were turned in, 76,408 being passenger cars.

Dividing this immense registration among the various states places Massachusetts at the head of the list with 136,790, more than half, and leaves only 136,164 machines for the other five states.

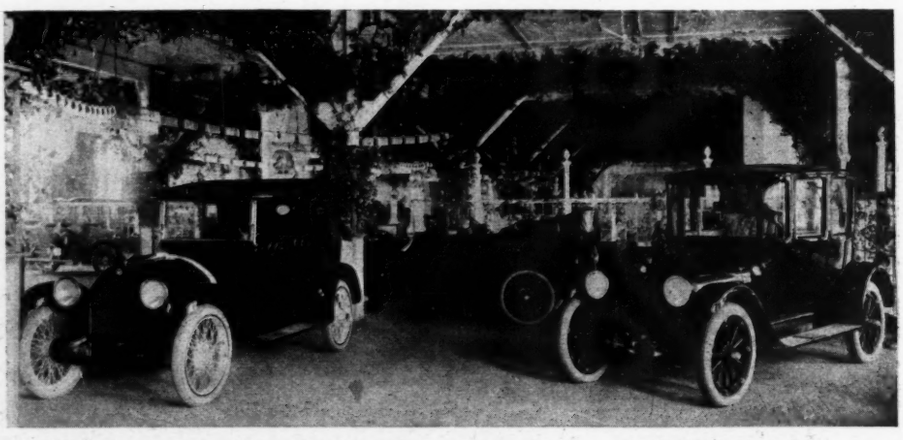
Connecticut is next with 56,048, an increase of 44 per cent over 1915; Maine is third with 28,951; Rhode Island comes next with 21,406, a gain of 30 per cent; New Hampshire is next with 15,508, a gain of 43 per cent; and Vermont has 14,251, an increase of 24 per cent.

What New England will do in 1917 is fairly well indicated. Massachusetts authorities, for example, point out that there are 200,000 persons in the state who on March 1 filed income tax returns showing that they have incomes of at least $2,000 a year.

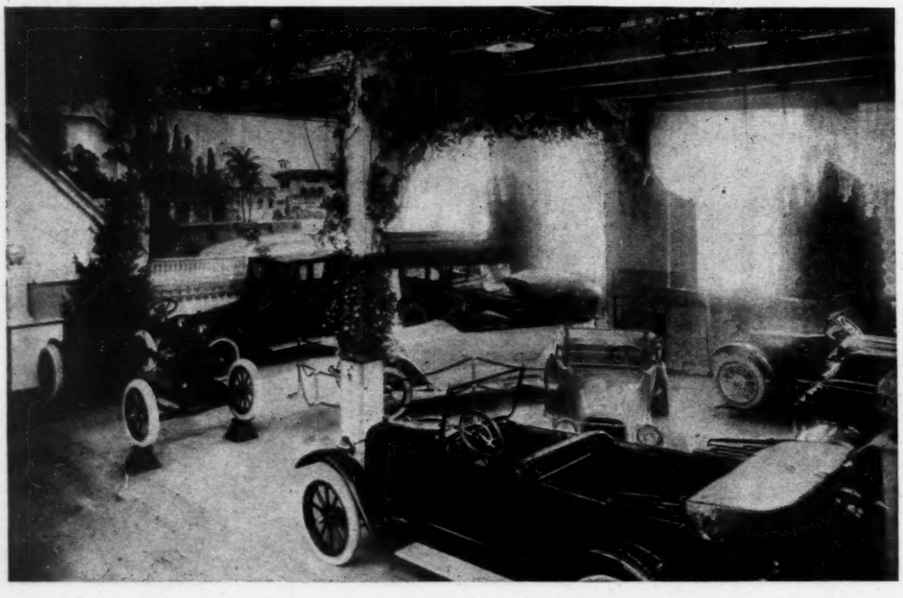
A man can operate a car on $2,000 a year, and as the Bay State to-day has about 100,000 cars, after deducting trucks and duplicate registrations, this leaves 100,000 persons with incomes of at least $2,000 who are prospects for cars. In other words, an increase of 100 per cent in Massachusetts is possible, and dealers are optimistic enongh to believe that this expectation will be very nearly realized.

New England is buying touring cars. And one prominent reason why this should be so is that New England is the playground of the East. It is the touring ground of the eastern seaboard. The New England car owner wants carrying capacity; he wants to take his friends with him on his trips. And so the touring car reigns supreme. Of late a plainly apparent demand has sprung up for the new three- and four-passenger roadsters and the demand for the regulation two-passenger roadster holds strong.

Dealers point out that the four-passenger roadster is the kind of car that is purchased largely by men of means who have other, larger cars in their garages, but who want the smaller car for short trips to the country club and to drive around the city. They may give their friends a lift on these short runs, and the friends don't expect the comfort that is necessary on a long tour. The four-passenger roadster gives the owner a place for himself and his friend and plenty of space in the rear for golf sticks.

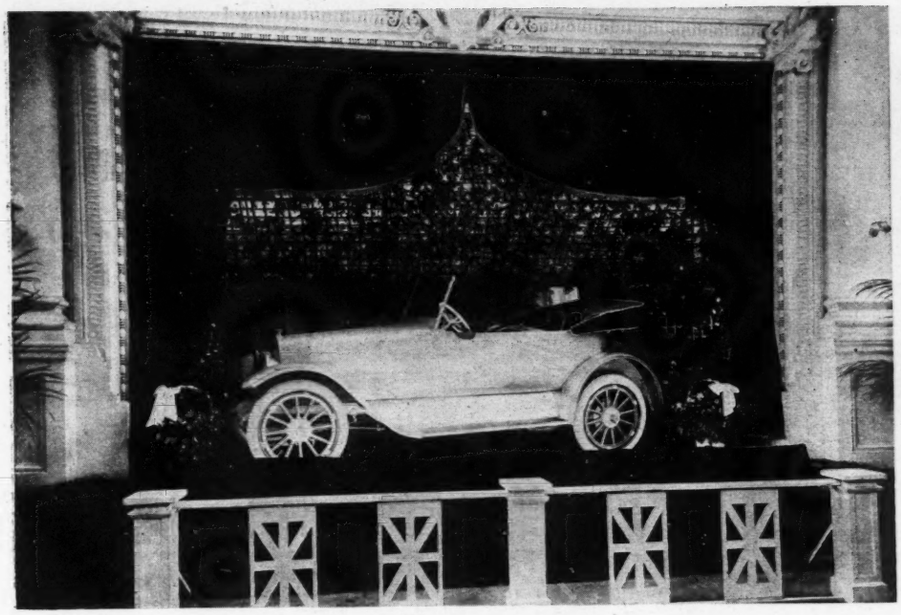


Effect one gets on entering Exhibition Hall. Foliage has been used lavishly and there are hundreds and hundreds of strings of colored lights reflected by banks of crystals. This is the Studebaker exhibit



A corner of Exhibition Hall, showing the exhibit of the Chalmers Co. of New England. Here is the complete Chalmers line

The vogue for bright colors is spreading. Nearly every dealer is prepared to supply cars painted in special colors, and there is some tendency toward pushing such cars. The firm of Shauck & MacMurray, Boston Apperson dealer, for example, last year made a specialty of selling special jobs. Every car sold was painted in a different color, some of them bright enough to be conspicuous and others just a little different from the ordinary. There never is any difficulty in selling these cars,



As usual the Pope-Hartford Co. of Boston occupied the whole of Paul Revere Hall with its Mitchell exhibit. Here is the gold car in a flowery picture frame on the stage

though some dealers report a slight difficulty in keeping them sold. They say the prospect becomes enthusiastic over a special color, buys it and drives it a few times and then seems to tire of it. In many cases dealers have had special color jobs thrown back on their hands to sell, and in other cases purchasers have insisted on cars being done over in more somber colors. This applies, of course, only to the cars which are painted in really bright colors, such as canary yellow, red, the lighter grays and blues, etc. Cars which are just a little different, the dark maroons, dark blues and greens and the dark battleship grays, for example, are very popular and seldom give any trouble either in selling or in keeping sold.

It is to color combinations such as these that the New England purchaser is turning quite readily. Stock colors are always in demand, and the dealer never has any difficulty in changing the mind of a prospect who may have a hankering for a special job. There are scores of arguments why a prospect should prefer a stock color, and not the least important of these is the possibility of getting the car in much less time than is needed for special paint.

Incidentally, the delivery problem is a genuine problem in New England, what with freight embargoes and the roads under several feet of snow. Dealers are not getting anywhere near as many cars as they want and in many cases are taking deliveries by express. This, of course, cuts a hole in their profits, for no dealer will make a purchaser pay the excess cost of express over freight. There has not been a great deal of driving cars over the roads. Up in Maine, New Hampshire and Vermont the roads are under 2 ft. of snow, and there is not much likelihood that they will open up for two weeks yet.

But in spite of the snow and in spite of slush and sleety weather, the public is flocking to the Boston show. On opening night, estimates of the attendance vary between 45,000 and 50,000. At any rate, half an hour after the doors were thrown open at 2 p. m. it was all but impossible to push through the jam.

Trucks Reflect Prosperity

BOSTON, Mass., March 3—New England's great prosperity during the last two years was reflected in the motor truck exhibits at the show. More makes, with a greater variety of chassis and novel body ideas were exhibited this year than at any of the shows since the last exclusive truck show held in 1913.

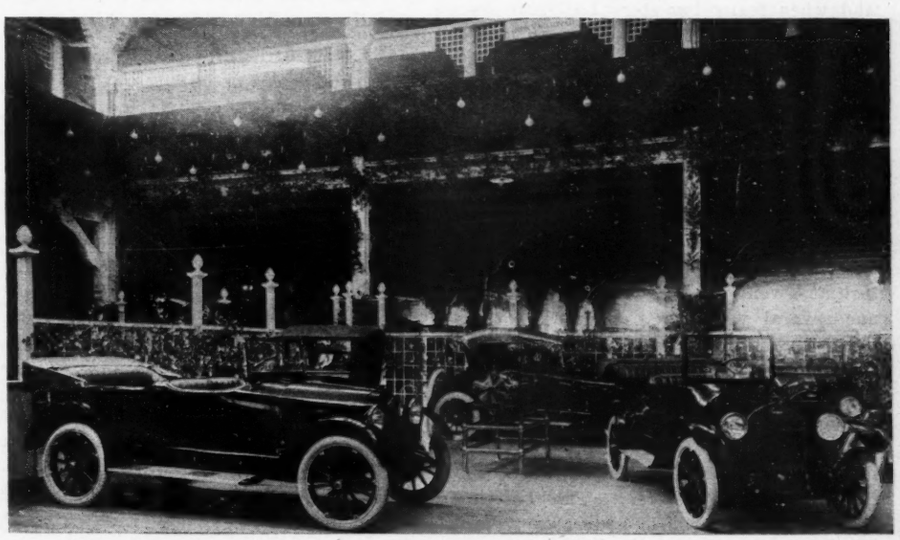
New Englanders have been large purchasers of motor trucking equipment during 1916. The average increase in the use of trucks in the five New England states has been approximately 76 per cent over those in use in 1915. There were 31,000 odd trucks in New England on Jan. 1, 1917. Massachusetts, the largest user of commercial vehicles in the five New England states, had 18,000 odd trucks at the beginning of the year. In 1912 she had but 4000 odd. This shows an average yearly increase of 3000 odd or 45 per cent a year. Over the five-year period her trucks have increased more than threefold, or approximately 363 per cent.

Truck Increase Gradual

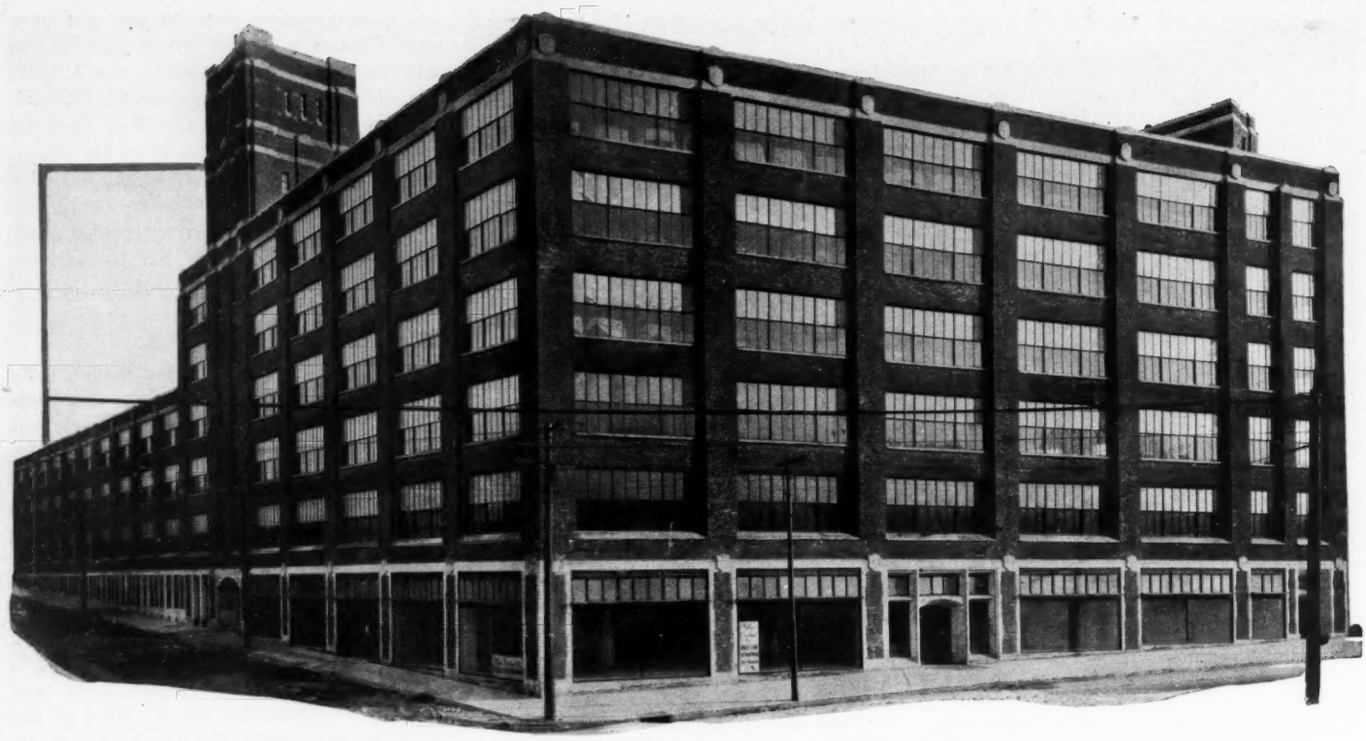
This increase has not been made in fits due to the large number of war contracts placed in the New England territory, but has been gradual. Perhaps nowhere else in the country has the growth been more consistent. Once convinced of the worth of motor truck delivery equipment, the conservative New Englander buys year after year, adding to his fleet as the demands of his business require it. He is loath to change from one make of a truck to another. When he has once found a truck which meets his needs, it is very difficult to wean him away. Most of the New England truck fleets are of a single make, different makes usually being bought only when the desired capacities are not offered in the original type bought.

The increases in trucks in the territory have been general. The section's prosperity has enabled many small merchants to invest in motor equipment to replace the slower animal transportation. The great beehive of industrial factories in the territory has also been forced to use the quicker delivery because of the large increase in business. Many of these concerns have employed trucks in overland haulage, thereby circumventing the unusual delays incident to the freight car embargo along the Atlantic seaboard.

New building construction made necessary by the increase in manufactured products and war munitions also has been responsible for a large increase in trucks.



Between the exhibits lattice fences were erected and over them trailed brightly colored foliage. This shows the Chevrolet exhibit



The Willys-Overland branch building marks the expansion of Kansas City's motor row, for it is four blocks farther south

K. C.'s Motor Mart

Ignoring Distance as a Trade Factor, Kansas City Widens Boundaries of Dealer District

By B. S. Brown

KANSAS CITY made notable progress during the year 1916 in the direction of adequate and appropriate housing of motor car and accessory industries on motor row. The row had been harbored in makeshift quarters, adapted from existing buildings, mostly one-story structures, until two or three years ago, when more pretentious structures were undertaken and when many two-story buildings were put up. The first overflow from Grand avenue, Kansas City's widest and most traveled thoroughfare, which has a double track car line, was to McGee street, next East, which has also a car line, double track, through most of its business section length. The Overland company was the first to discover that distance is an inconsiderable item in the motor trade and erected what was then a magnificent structure at Twenty-first street and Grand avenue several years ago. Then the Studebaker building went up, at Twentieth and Grand, and was occupied in 1916. Expansion last year ofthe district is shown in the building of the Willys-Overland branch four blocks farther south, extending through from Grand to McGee, about 400 ft., at Twenty-fifth street. This building has seven acres of floor space, partly six stories.

Other large structures in this new district are also being adapted now to motor car uses.

The Firestone building was erected last year and is now occupied by the tire company and branches of motor car companies, at Twentieth street and Grand avenue. It is eight stories, 75 by 115 ft., of an especially attractive style of architecture.

Many New Structures on McKee

The White company entered its new building, used as a branch and service station for motor cars and trucks in April last year; this is one of the many new structures on McGee street. The Hudson-Brace Motor Co., distributor of the Hudson, has extended its quarters through to Oak street on the East, with the addition of a large service station. The Velie company has erected a handsome two-story building on McGee, and there are many one and two-story structures erected in the last year or so on this expanded section of motor row.

The development of the truck industry is exemplified by the erection last year of the commodious one-story home of the Republic, by the Dougherty Motor Co., on McGee, which has also a four-story building nearby for warehouse and service station. The company also has quarters on Grand avenue for other activities.

An important addition to the facilities of the farther-south district has been the Moriarty building at Twenty-second street and Grand avenue, erected by those pioneers of the industry in Kansas City, E. P. and J. F. Moriarty, distributors of the Mitchell. This structure is at the junction of Gillham road and Grand avenue, a short block from McGee road, the chief motor thoroughfare and near the boulevard leading to the Union Station, two blocks away.

Kansas City still has many shacks on its two-street motor row; but much of the ground around the newer buildings is vacant, giving hope that the development will be more consistent there.

The new Willys-Overland distributing plant and salesroom at Kansas City combines all departments of an ideal station. The structure is a six-story fireproof building of concrete and pressed brick of the usual heavy steel frame. The ground floor is divided into two portions, the sales and display room and the second-hand department. The second-hand cars are displayed in a room accommodating over sixty cars. Then there is a space about a block long where the used cars taken in on trades are housed until

they are overhauled and put in good mechanical condition.

The building is accounted one of the finest distributing plants in the world, although it is but one of a number of plants built by the Overland company in the last three years. Over one-half of the wall space is window lighting. This gives every department from the offices on the second floor to the proposed paint shop on the sixth a flood of light during all the working hours. Every department is provided with drinking fountains and toilet conveniences. An extraordinarily comfortable ladies' rest room opens off the sales floor. The structure contains 300,000 sq. ft. of floor space, or 6¾ acres, and is so constructed that four more stories may be added at any time.

Amount of Work Estimated

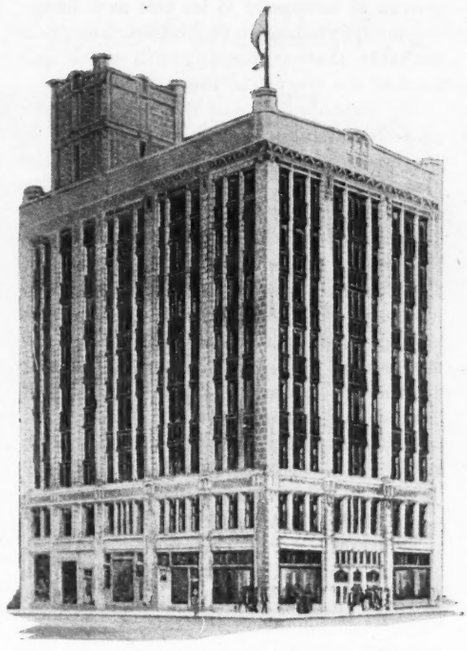
The service department entrance is on the McGee street side. The service plan is to have the car examined by a foreman who determines the amount of work to be done.

If it is a quick service job requiring under 30 min. work it goes to the Quick Service Department on the second floor. If the work will take longer, the car goes to the third floor.

There is 144 ft. frontage on Kansas City's main thoroughfare, Grand avenue, and 349 ft. length on the Twenty-fifth street side. The rear 150 ft. is only a four-story structure. This rear part is for service and storage while the front is to be used as office, display and storage rooms.

There are five desks on the main floor in the salesroom; these are for the salesmen and the convenience of the patrons. The front section of the second floor is occupied by the offices of the branch. S. W. Ramsey, manager, and C. T. Hinkle have offices in the north portion of this floor.

There are two basements; the first is probably to be converted into an overflow room, and the sub-basement contains the power plant, heating plant and boilers. Two large freight elevators handle the



The Firestone building is occupied by the tire company and branches of motor car companies

cars; they are the Otis electric heavy-duty type. The parts room will carry approximately 9000 bins. The third floor is the main machine shop and battery department. There are nine wash racks and two scrubbing decks also on this floor. There is 400 ft. of overhead track for conveying heavy parts and motors. The foreman of the machine shop says that the plant will take care of 200 repair jobs a day.

On the fourth floor there are over 600 new cars stored. This method of holding a large number of cars in readiness facilitates delivery to the territory and greatly improves the dealers' chances of keeping their deliveries up-to-date. The machine shop has two large lathes, a new 40-ton arbor press and the regular equipment of special tools.

There is a large filter in the sub-basement and this purifies all the water that goes into the building, the drinking water and all water used is thus assured to be pure. The building cost $750,000.

Truck industry development has witness in the home of the Republic. A four-story warehouse and service station is nearby

DATA ON CAR MAINTENANCE

San Antonio, Tex., March 2—The Manufacturers' Club of this state, through the secretary, C. C. Leel, has finished collecting statistics to show the cost to the various manufacturing concerns here for the upkeep, depreciation and other expenses for the motor cars used by their salesmen. In response to Mr. Leel's letter containing a series of questions, replies were received from thirty-five firms. The summary of the report shows that the salesmen of 64 per cent of the firms who replied furnish their own cars. The remaining 36 per cent of the firms own the cars.

In most instances where the salesmen furnish their cars, the cost is included in salesmen's commissions or salary. The concerns which stipulate a special allowance to their salesmen allow them from $25 to as high as $60 per month, the average working out at $43.33. Where the concerns themselves furnish the cars, the cost for the gasoline, tires, depreciation and other similar expenses range from $22 to $55, the average being $30.20.

The fact that the salesmen of some concerns make a considerably larger mileage than those of others is taken into consideration in compiling the estimates for these.

It is estimated that salesmen use their cars on an average of about 24.6 working days. In the answers to the questions the figures ranged from eighteen to thirty days per month. The number of miles ran from 550 to 2300, country salesmen, of course, making greater mileage than those working in the city. The average number of miles is estimated at 1342.

The most exhaustive information was furnished, according to Mr. Leel, by the Union Meat Co., which has kept special records on three salesmen's cars and two heavy delivery trucks. Their salesmen's cars run on an average of 603 miles per month, ranging from 9 to 16 miles on a gallon of gasoline. The cost per mile was from .007 to .017 cents. The cost per mile for the 1-ton truck averaged .015 cents, and for the 2-ton truck .025 cents.

TO MAKE TRUCK UNIT

Grand Rapids, Mich., March 2—The Miller Auto Sales Co. will manufacture a new truck unit to be known as the Mil-Ton, for which it will act as state distributer and assembler. To properly finance the undertaking, changes were made in the company, and W. C. Miller was made president and general sales manager; L. W. Coppeck, formerly of the Decator Truck Co., vice-president; and L. A. Corcora, secretary and treasurer.

To Import Racing Cars

American Speedways Association Arranging to Bring Sunbeams and Fiats

Rickenbacher Probable Driver and Manager of English Car

INDIANAPOLIS, Ind., March 5—Addition of four foreign cars to the American racing contingent for the 1917 season was partially assured by the announcement made to-day at the meeting of the American Speedways Association that definite arrangements for the importation of two Sunbeams and two Fiats were completed. It it understood that the speedways as an association will be responsible for bringing the cars and their drivers to this country, presumably guaranteeing their expenses and a pro-rated division of these expenses is to be made among the speedways, based on the number of miles the cars are raced upon individual tracks.

Announcement that the two Sunbeams are to appear under the sponsorship of the Speedways Association seems to show that Weightman, the millionaire California sportsman, who hoped to get two and perhaps three of the English cars through the efforts of Rickenbacher, was unsuccessful, as it is not believed that there are five cars of this make available. This is strengthened by the fact that Rickenbacher is slated as a probable driver of one of the Sunbeams for the Speedways association and manager of the Sunbeams.

As announced in January, the drivers for the two Fiats probably will be Jack Scales and Enrico Cagno. These men have been connected with Fiats for years and drove for them in the last European road race—the French Grand Prix of 1914. Cagno can boast of a victory in the Targo Florio cup races, the speed classic of Italy.

The four European cars will be shipped within the next thirty days so that they may participate in the opening meet of the season, New York, May 19. The deal with the Fiat factory was closed by W. F. Bradley, MOTOR AGE'S special European correspondent and manager of the victorious Delages that took first honors in the 1914 Indianapolis race.

Timing and scoring of all races will be done by a crew of expert timers and scorers which will officiate at all meets, it was decided by the association. Two electrical timers are to be purchased.

DUNHAM TO BRING OUT TRACTORS

Detroit, March 5—George W. Dunham, recently elected president of the Society of Automobile Engineers, has perfected a farm tractor that will probably be placed on the market in the near future. It is reported that Mr. Dunham's tractor has proved so successful in its test as to interest many prominent capitalists, and it is probable that a company will make and market the tractor in the near future.

Mr. Dunham is one of the men who have gained leadership among the engineers of the motor car industry. He designed the first Hudson car, had a prominent part in developing and perfecting the four-cylinder engine of the Oldsmobile and later was the head of the engineering department of the Chalmers company as vice-president in charge of engineering and director. He has operated as a consulting engineer for the last two years but has devoted most of his time to the study of the tractor, and Detroit engineering workers believe that with his vast experience he is likely to set a new standard in this field.

SPEEDWAY IN TROUBLE

New York, March 6—Special telegram—The Sheepshead Bay Speedway Corp., which built the 2-mile board track speedway is in financial difficulties and has called a meeting of its stockholders for March 21 to discuss plans for reorganizing. The trouble is connected with a mortgage of $2,040,000 on real estate. A foreclosure of this is under way. There is over $50,000 interest due on the mortgage. The trouble goes back to the building of the speedway, when construction work greatly exceeded all estimates. There was not sufficient capital at any time, and the two years of racing were not financial successes.

COLE PRICE UP $100

Indianapolis, Ind., March 6—The Cole Motor Car Co. will advance the price of its touring and roadster models $100 on April 1. A similar advance was made Jan. 1 when the price was put at $1,695, which now becomes $1,795.

KISSEL ADVANCES

New York, March 2—The Kissel Motor Car Co. yesterday advanced $50 on the 6-42 models and $100 on the Hundred Point Six models. The touring Sedan now sells at $1,735; the Hundred Point Six touring car at $1,295, and the De Luxe 6-42, seven-passenger, at $1,750.

KARDO PATENT UPHELD

Cincinnati, Ohio, March 6—The Kardo front axle patent has been upheld by the United States Circuit Court of Appeals which declared it infringed and upheld the validity of claim 1 of patent No. 753820, granted March 1, 1904. According to the decision the decree of the lower court in the suit of the American Ball Bearing Co., against E. B. Finch, a former Cleveland Chalmers representative, is reversed. The decision of the lower court held the Baker patent void, upholding the prior art claims of the defense from which the American Ball Bearing Co. appealed. The patent has to do solely with the means for mounting and turning the front wheels of motor cars.

Plans 250-Mile Race

Event at Windy City for June 9 Not a Championship—$20,000 Hung Up

Non-Professional Contest for 200-In. Cars Probable Curtain Raiser

CHICAGO, March 6—Plans for the first race of the Chicago season were announced yesterday by the Speedway Park Association. This has been set for June 9 and will be for a distance of 250 miles with a purse of $20,000. The event will not be classed as a championship event as the American Automobile Association has decided to allot each track only one of the championships and the Chicago number is to be reserved until later in the year. This race will be limited to 300 cu. in. displacement, but as a curtain raiser it is planned to stage a 100-mile race for non-professionals in the mornings, limited to cars of 200 cu. in.

After two years of experience the Chicago management has learned not to wait until the last week before making its plans for handling the crowds and will establish 1000 branch ticket agencies at various places within a 100-mile radius of Chicago.

Several trials have been made of the Chicago track so far this year, and it has been found in fine condition. Fred Duesenberg has used the oval for testing his new engines and reports that the track is as fast as new. Webb Jay, who has put a Fageol through its paces, declares the track seems to improve with age. The only repairs contemplated consist of repainting the stands and garages and rerolling the infield as soon as the frost is out of the ground.

FIRE ATTACKS STUDEBAKER

Indianapolis, Ind., March 5—Fire of mysterious origin threatened the entire plant of the Studebaker Corp. Saturday afternoon and destroyed the assembly room, which contained 200 cars. Lack of water pressure prevented early control of the fire. The loss is estimated at $30,000.

KISSEL TWELVE SOON

New York, March 2—The Kissel Motor Car Co. will start active production of its twelve in about 2 weeks. The car will sell at $2,250 for the regular touring bodies, and $2,650 with the All-Year Sedan.

The motor will be 2⅞ by 5, with overhead valves. Other features include force-feed oiling, multiple disk clutch, Delco ignition, Stromberg carbureter, both internal expanding and external contracting brakes, underslung three-quarter elliptic rear springs, vanadium springs on both front and rear, Goodyear tires, and Firestone demountable rims, with two extra rims.

In the Home of the Real Americans

Arizona, Where Tepee Prevails

Just a Forerunner of a Section to Be Treated More Fully in the Touring Issue, April 5

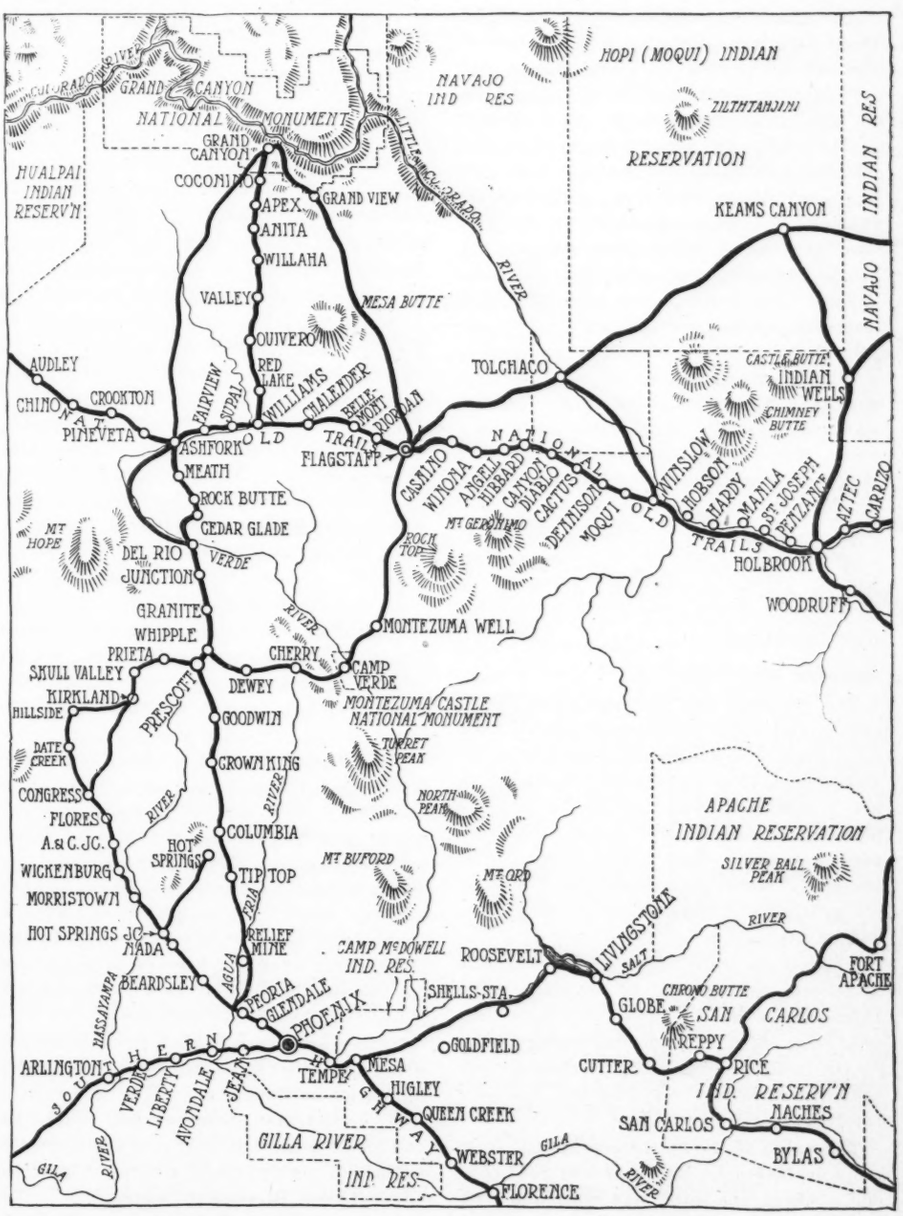
BACK in the stirring days of prairie schooners no one relished Indians and those intrepid pioneers fared forth with a prayer on their lips that none would be sighted. To-day, when the twentieth century means of transportation takes you down through the Southwest, you would be disappointed if in making the trip you saw no Indians. Thanks to our Government there are reservations—many of them in Arizona and the Southwest—where the Indians live, some in the more modern way, some in adobe huts, some in tepees.

First of all let us assure you, should there be among those who read this some who think the Southwestern Indian is no more civilized than back in the days of 'forty-niners, that you court no danger from being scalped by directing your itinerary down the once moccasin-trod paths that have become highways. If the writer did not know that there are people—car owners with thoughts of transcontinental touring in mind—who labor under the impression that the Indian is an element of danger to one crossing the western country on the way to the Pacific coast, the foregoing sentence would not find place in this brief synopsis of what there is to be seen in Arizona. Last summer I was shown at least a half dozen letters in a certain newspaper office of a Colorado city, all of them written by people in the East, in which inquiry was made as to whether there was danger from Indians along the southwestern roads. This may sound absurd, but nevertheless it is true.

Probably one of the nature freaks of Arizona is the Petrified Forest to the east of Holbrook. Why the giant trees should have gone to sleep—that in a way is what they appear to have done—is puzzling. These trees are not criss-crossed but lay generally with their tops to the South. What laid them low is not known; it may have been a cyclone or a submergence. These forests cover many thousands of acres and are in five separate tracts. These trees truly represent God's acre for they live again in adamant and agate of every conceivable color. Don't get the idea that these trees are standing; they are prone on the ground, some of them partially covered, but still retaining, in many cases, their bark. Annular rings plainly show how old they were at the time they ceased to grow. So varied and bright are the colors it seems as if rainbows had become entangled and forced to remain on earth.

Nature's master work—the Grand Canyon—is found in Arizona. Here color is king. So many have attempted to describe the ever-changing, deepening shadows that run the full gamut of color combinations, and admitted their weakness in the use of superlatives, that the writer begs to be excused from a description. The Grand Canyon is referred to as a fifteen-by-two hundred-mile paint pot, the bottom of which is a mile below the top rim. The canyon is off the main through route to the coast, but can be reached over good roads.

Next week we will tell you briefly of another section that will be dealt with more at length in the Touring issue, April 5.



Roads in Arizona which lead through Indian reservations and to the Grand Canyon

PROSPERITY AT OMAHA

Wealth of State Reflected in Sales at Annual Show

OMAHA, Neb., March 3—The Omaha show is the largest small show of the season. Prosperity and good weather are the reasons. It is the twelfth annual show, and 218 cars, trucks and tractors were on exhibit this week. Twenty-six of these were closed cars, eighty touring cars, thirty-five roadsters, seventeen chassis, seven electrics, fifty trucks and three tractors.

Added Space Not Enough

The Omaha association added 10,500 sq. ft. of floor space by a temporary annex to the auditorium this year, but many dealers were turned away, and it was impossible to exhibit accessories at all. Though eighty different makes of gasoline cars and three different makes of electrics were displayed, there were only forty-five car exhibitors. Most of the dealers here handle two, and often three, makes. Nebraska wants touring cars, and Nebraska dealers are showing the cars that sell. Therefore, touring cars were in the majority.

The decorative scheme of the show was good. It was styled "Hawaiian," but it was good anyway. Green and white were used. The sales of the show were more important than the decorations, however. Walking through one could see sales in all stages. Most of the purchasers wanted to know the specifications of the car before buying. Many of them are farmers and have owned other cars, which have made them car-wise.

Governor Was Visitor

The governor and members of the state senate and house of representatives came from Lincoln to attend the show yesterday. Under an invitation extended by the dealers' association, both the senate and the house of representatives voted to adjourn for the purpose. This is doubtless the first time any state government has officially recognized the importance of the motor car business.

Nebraska's prosperity can explain any display of selling ease in the state. The thirteenth state in area, Nebraska last year was fifth in crop percentages and fourth in total crops. The percentages are taken in ratio to the population, 1,250,000 for Nebraska.

The value of the thirteen principal farm crops in Nebraska last year was $343,655,000. About one-third was corn and one-fourth wheat. Nebraska live stock last year numbered 5,331,010 head, valued at

FARMERS WANT CARS

$244,573,708. Bank deposits in the state total $340,717,000—an average per capita of $286.62. These bank deposits have increased $155,171,000 since 1910. Building and loan association resources in the state are $47,917,847.

The state now owns 100,534 cars, last year it was 59,140. The gain in car ownership during 1916, 41,394, is more than the total number of cars owned in the state in 1914. Comparative figures from other states, where the total registration is above 100,000 cars, show that in the number of cars per capita Nebraska is headed only by the state of Iowa. In Iowa the population per car is 11.2, and in Nebraska 12.37.

Cheaper Cars in Majority

The motor cars sold in 1916 were of the less expensive type. This indicates that those somewhat lower down in the financial scale are buying motor cars. Farmers are buying them largely on account of the nature of the country, which is rolling and often sandy. But in the cities the same condition holds, for different reasons. People of fairly modest means, as the term is considered in Nebraska, are buying motor cars. Almost every small business man has his car. Practically every retired farmer who is now living in the city has one. Mechanics, tradesmen, policemen, even newspaper reporters, are riding in their own cars. And the conservatism which has amassed the wealth which Nebraska boasts today makes the tendency that toward the less expensive car.

This does not mean that there is no market here for high-priced cars. Far from it. The dealers and distributors of high-grade cars are doing big business. They are flourishing. The Pierce-Arrow, the Packard, the Cadillac, the Stutz, all are common enough sights on the streets of Omaha and of other fair-sized cities in the state. But when you see one of these you can be sure the owner is able to support a flock of them if he desired.

Trucks are common, but there is still a great field for this business. The larger industries in Omaha are about half motorized, department stores almost wholly so and small dealers largely so. Farmers are taking to light trucks somewhat and to heavy trucks in smaller degree.

The tractor situation is unique. Though the business in this territory is still in its infancy, it is an exceedingly lusty infant. And it is being cultivated almost exclusively by the farm implement trade. Motor car dealers and distributers appear to be so busy handling pleasure cars or commercial vehicles, according to their respective lines, that they have neither the time nor the inclination to take on tractors.

As an example of the growth of the tractor trade here the tractor school conducted by the International Harvester Co. at the show may be cited. Omaha has more than 200 farmers who came for the express purpose of attending this school, and they have been buying tractors at a lively rate since they arrived.

Omaha, the principal city of the state, has a population of 200,000. It is the second live stock market of the world. It is the second primary corn market of the world. It is the first feeder sheep market, the first range horse market and the second sheep market of the world.

Omaha as a Market

Omaha's motor car trade in 1916 amounted to $30,007,134. Of this $4,347,000 was accessory business. Its area of distribution covers all Nebraska and Wyoming, half of South Dakota, one-third of Iowa, one-fourth of Kansas and corners of Missouri and Colorado.

Omaha's jobbing trade of last year amounted to $183,759,493, an increase of 20 per cent over 1915. Her bank clearings passed the billion-dollar mark, reaching $1,279,158,591, an increase of 25 per cent over the previous year. Her packing house industry amounted to $149,768,860. Seventy per cent of all livestock received in this great market is packed here. The smelter output for the year was $46,019,279. New buildings erected during the year amounted to $7,226,107.

Savings Show Thrift

The thrift of Omaha and of the state at large may well be shown by savings deposits in Omaha banks. There are at present 78,559 savings accounts amounting to more than $500 each in Omaha banks, and the total savings account figure is $39,843,000. In other words, one out of every three persons in this city has more than $500 in the bank. Is it to be wondered that one out of every twelve people in Nebraska owns a motor car?

Of dealers and distributers in this territory, there are about 5000. In 1915 there were approximately 1500. The distribution of these dealers is approximately:

Nebraska, 3000; western Iowa, 1600; South Dakota, 400.

All the larger dealers in this territory are down to low ebb in motor cars on hand to fill orders, and the smaller dealers are little better off. Following the frantic efforts of distributers and dealers alike to get some action on the part of the railroads to load and rush cars west, the embargo orders on certain roads against other classes of freight and the "home route orders" were hailed joyfully in the hope that these might serve to alleviate the situation. This has been realized, it is said, only in a small measure.

STROMBERG EARNINGS

Chicago, March 2—Net earnings of the Stromberg Motor Devices Co. of Illinois for 1916, all of which stock is owned by the Stromberg Carbureter Co. of America, were $278,000, or $5.50 a share on the stock.

MAY REVIVE REMINGTON

New York, March 5—There is a strong probability of a revival of the Remington company, which was organized a few years ago for the manufacture of motor cars, under the name of Remington Motors, Inc., with temporary offices at 100 Broadway, in the office of W. Morton Hetzel, a financial organization. The new Remington is expected to list at approximately $1,050 and will use a Wisconsin engine. Negotiations are at present on for securing a factory for assembly purposes. A complete organization has not been effected, but a few officers have been selected. David Rheinhol will be engineer. Factory work will be in charge of E. H. Chappell.

FORD SHOWS HIGH ECONOMY

Chicago, March 3—A gasoline mileage of 29.8 miles per gallon was recorded in an official A.A.A. test on a Ford touring car in Chicago yesterday. The test was performed to demonstrate a new carbureter of somewhat unique principle developed by the Automobile Mfg. Co., of this city. Tests for economy and acceleration were made first with the stock Ford carbureter at the point where it gave best economy and good pulling power and the test then repeated with all conditions the same except that the new carbureter was substituted. Weather conditions were very bad for economy showing as there was a strong cold wind blowing and temperature way below freezing. With the stock carbureter, a mileage of 15.4 miles per gallon was registered. There was one traffic stop. An acceleration from 5 to 25 miles per hour in 14.6 sec. obtained. With the new carbureter, a mileage of 29.8 miles per gallon was registered and an acceleration from 5 to 25 miles per hour in 13 sec. There were six traffic stops during the latter economy test, the car carried three people. The test was sanctioned by the American Automobile Association and was conducted by E. A. Hillman, technical representative of the contest board of that association.

Miners Crowd This Show

Wilkes-Barre Exhibition Demonstrates Wealth and Resources of Coal Region

Attendance for Week Was Between 30,000 and 40,000

WILKES-BARRE, Pa., March 5—The show held in this city last week did more to demonstrate the wealth of the surrounding region than could anything else. The characteristic attendance at shows in most other cities of the size was absent—there were comparatively few farmers here. Instead of farmers made wealthy through manipulating the market, there were hundreds of coal operators and men connected with these operations, for be it remembered the Wyoming valley, picturesque and rich in its resources, produces between 40 and 50 per cent of all the anthracite, or hard coal, mined in the United States.

The show was held in the Armory and Hampton Hall. It was an improvement over last year in that there was more space. Even at that the space was limited because of the demand. There were thirty-one dealers exhibiting seventy-seven cars. The show next year probably will be held under one roof instead of two. Between 30,000 and 40,000 attended.

Wilkes-Barre is the center of the anthracite fields and owes its wealth and prosperity to its location in the heart of one of the richest anthracite fields in the world. The value of coal produced is greater each year than all the gold produced in the country at the same time. During 1916 Luzerne county produced 35,266,086 tons of anthracite. This is almost half of the production in the entire state.

CAUSAN LEAVES CHALMERS

Detroit, March 5—Nemorin Causan, the French motor car engineer, who has been employed in the drafting room of the Chalmers company recently, has resigned his position and will leave America. Mr. Causan suffered a severe illness from gas while serving in the European war and will return to France for medical treatment. He is the designer of many famous racing cars and was formerly editor of the Technique Automobile.

TO INCREASE MISSOURI FEES

Kansas City, Mo., March 5—The Missouri legislature has passed a bill providing for double the license fees that have been collected heretofore. Each motor car owner will have to pay around $10 a year instead of $5, the fees being graduated according to horsepower from $5 to $12. License fees for trucks are rated by weight unloaded, from $5 for 2,000 lbs., to $30 for a truck weighing 10,000 lbs. unloaded.

The clubs and dealer associations have been furthering the bill providing for these increases. They have assurances that the money will be spent on the state's roads. Other measures in the general assembly provide for appropriations up to $200,000 for assisting counties in building roads, for a tax of 10 cents on the $100 for road purposes and provisions by which the state can take advantage of the federal road extension plan.

For several weeks it looked as though the state would enact legislation that would eliminate municipal licenses for motor cars, or would provide for doubling the municipal licenses. When the state started to double license fees, the cities saw a chance to get more money, too, and many officials went to Jefferson City to protect their interests. The state law as passed by both houses provides, however, that no city can charge more than half the amount of state license fees for its local licenses.

U. S. RUBBER EARNINGS

New York, March 6—Special telegram—Net sales of the U. S. Rubber Co. for 1916 were $126,759,129, compared with $92,861,016 in 1915. The balance available for dividend on common stock is $5,442,113, or 15.12 per cent on the outstanding $36,000,000, compared with 9.51 per cent in 1915. The sale of $16,000,000 first and refunding mortgage, 5 per cent bonds, announcement of which was made several weeks ago, provided funds for the company to pay its entire debts and the debts of its subsidiary companies with the exception of $9,000,000 General Rubber Co., dedentures due December, 1918, and $2,600,000 Canadian company due October, 1946.

STUDEBAKER EARNINGS FOR 1916

South Bend, Ind., March 5—The annual report of the Studebaker Corp. shows the net sales for the year ending Dec. 31, 1916, to be $61,988,594.09, from which was derived a profit of $8,611,245.08, or 13.89 per cent. After deducting 7 per cent dividends on preferred stock 26.14 remained for the common stock, of which 10 per cent was distributed in dividends and the balance was added to the surplus. The surplus now equals 57.40 per cent of the outstanding common stock. The book value of the common stock Dec. 31 was $91.38 a share.

PLANS ACCESSORIES SHOW

Chicago, Mar. 6—An accessories show covering a city block is planned by Rothchild & Co., one of Chicago's largest department stores. This exhibit will occupy the seventh floor of the store for the week, beginning March 17, and special arrangements have been made to show most of the accessories in actual use. One hundred and twenty-five demonstrations will be in progress constantly. The booths will be in charge of manufacturers' representatives and experts, the object being to make it an educational sales exhibit. Naturally, special prices will be quoted on accessories that week.

Akron Boy Scouts educate the pedestrian

Jay walkers are shown how to cross streets

Walk with the Tide

Akron Boy Scouts Set Example That May Well Be Emulated by Others

By William K. Gibbs

PROUD are the fathers and mothers when the day comes that they can say to their friends and relatives that their heirs apparent "are learning to walk." In our early perambulations our course was restricted to the layout of chairs and other furniture about our home. Too many of us continue to walk through city streets the same way we laid our course when we began learning to walk. There is much progress in the art of walking that might be made by the average pedestrian. If he would adhere to the principle of going straight and moving with traffic instead of across or through it, it would be better for himself—safer at least—and for everyone on the streets.

As indicative of what may be done in the way of an educational campaign to promote greater traffic safety, attention is called to a plan put into effect by the Akron Automobile Club, Akron, Ohio, which was so productive of real results that the club has decided to re-open the work along broader lines as a part of the spring preparedness for summer motoring. Two hundred Boy Scouts were enlisted, under the leadership of Joseph W. Taylor, scout executive, for street work. Squads of boys were stationed at all the principal corners of the city where traffic officers are assigned. They were instructed to exert every energy to teach pedestrians to walk with the semaphore, that is, to wait for the traffic officer's signal before attempting to cross the street.

Objections Soon Overcome

Pedestrians were not inclined to take kindly to the restraint imposed upon them, but after the first day there was a noticeable improvement and since that time jay-walking has been far less prevalent in Akron than before. With the coming of good weather the club will employ the scouts for several weeks of continuous work, which will touch upon every phase of traffic control.

The scouts, with the aid of sticks on which were posters bearing traffic slogans, barred the way to pedestrians who would attempt to cross the street when traffic was moving across their path. As the officer signaled to move in the other direction, the scouts moved over and barred the way of those in the stream of traffic previously moving.

Here is a plan that might be adopted to advantage by every city. None can deny that the pedestrian needs teaching in order to prevent jay-walking. When the public comes to understand that the sidewalk and the street intersections are the only places where they rightfully belong and the only places where they are secure, then street accidents will be largely eliminated.

The plan of the Akron Automobile Club does not end with the Boy Scout idea, however. An aggressive campaign will be waged in which street railway lines, factories, organizations and all forms of publicity will be used to encourage all persons to observe the rules of traffic safety without waiting for the police to compel them to do so. The campaign has the full indorsement of the city officials.

Dodgers with safety-first maxims set forth in acrostic form, such as "traffic safety," "pedestrians beware," "hints for drivers," and "children be careful" have been distributed in the schools of Akron and adjacent towns. Through the co-operation of school officials, the pam-

phlets were made a part of the regular school work and in the higher grades made the subject of several lessons. The children studied the pamphlet and later were quizzed by the instructors. The work was then carried into the homes by the children who were instructed to take the pamphlet to their parents with the request that they also study the traffic-safety slogans.

Rules Will Be Adhered to

"Common sense will always prevail when pedestrians or drivers are properly instructed," says Grover Reese, secretary of the Akron Automobile Club. "We believe that the educational work which we have been doing and will continue to do throughout the coming year will have a tremendous effect in cutting down the number of accidents and the number of arrests for bad driving. Ignorance of the common sense rules of traffic control is in a large measure responsible for a great many of our ills. Therefore, without waiting for the police to correct the situation, we feel that by co-operating with the city officials and continuing to hammer at the public with educational matter, we can approach, if not reach, perfection."

It is just as reasonable to expect pedestrians to obey traffic rules as the operator of a vehicle. More often it is carelessness that prompts the pedestrian to jay-walk, than anything else. Education in walking across streets should not be difficult and is worth trying.

EVINRUDE TO EXPAND

Milwaukee, Wis., March 3—The Evinrude Motor Co., Milwaukee, Wis., is completing the erection of a complete new plant, costing $250,000 or more, and then will engage also in the production of a line of oil engines for heavy-duty purposes, such as farm use, tractor and truck motive power and other power applications. The capital stock is being increased from $350,000 to $600,000 to finance the construction of the new plant. Plans are being prepared by architects for a new machine shop, foundry and testing shop group.

Acrostic Leaflets Given to All Pedestrians

Please remember that the side-walks are for pedestrians.

Every time you cross the street, cross it, don't linger on the way.

Don't stand too near the side of a street car when it rounds a curve, thus avoiding being struck by the overhang.

Expedite traffic on side-walks by keeping to the right.

Step to one side and out of the way of others when you wish to tarry a moment.

There is a reason for everything except for a woman getting off a car backwards.

Roads and streets are primarily intended for vehicles.

In crossing at street intersections do so at right angles instead of cutting diagonally across from corner to corner.

Avoid interference with vehicular traffic. Remember vehicles seldom drive on the side-walks and you should not walk on the streets more than necessary.

Nothing is more careless than to step into the street without first looking to see what is coming from both directions.

Statistics show that many avoidable accidents occur in the middle of the block.

Be master of your time. Because you have eternity before you, do not plunge into it, to save a minute.

Eyes and ears are made to look and listen with.

Wait for the traffic officer to give the signal before attempting to cross at an intersection.

Autoists think the pedestrian should look out for himself a little.

Rich and poor alike must observe these rules if they would live to a ripe old age.

Enthusiasm for traffic safety on the part of everyone will improve conditions in Akron

FISK EARNINGS FOR YEAR

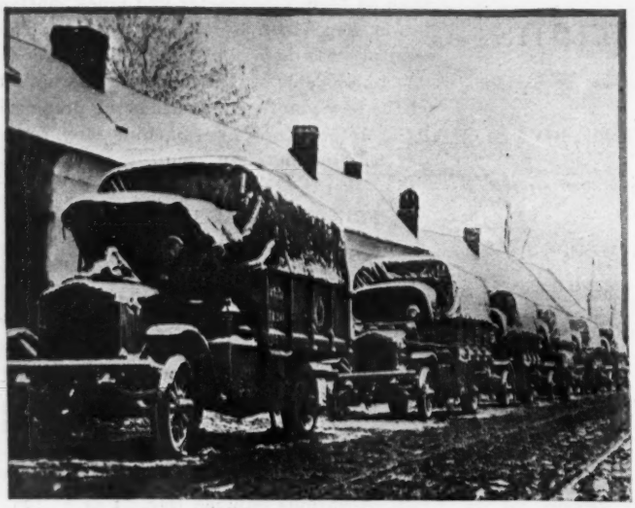
Chicopee Falls, Mass., March 2—The Fisk Rubber Co. made earnings of $1,741,704 for the year ending Dec. 31. Dividends amounted to $448,000, which left a surplus of $1,875,442, an increase from $1,246,394. Total sales for the year were $19,457,789. Net profits were $1,836,830, deducting manufacturing costs, depreciation and interest on borrowed money; $95,125, deducting unusual expenses absorbed a total of $1,741,705. A surplus balance Dec. 31 of $1,246,394, made the total $2,988,099. The total deduction amounted to $1,112,657, leaving a surplus of $1,875,442.

VACUUM OIL INSURES EMPLOYES

New York, March 2—The uncertainty of ships at sea has led the Vacuum Oil Co. to insure the lives of the licensed officers on its oil ships for the benefit of the officers' families in case of death by disaster at sea. This is said to be the first instance of an American steamship owner taking out insurance of this kind. Just now the steamship "Gargoyle," loaded with a cargo of bulk oil, is at sea, bound for Europe.

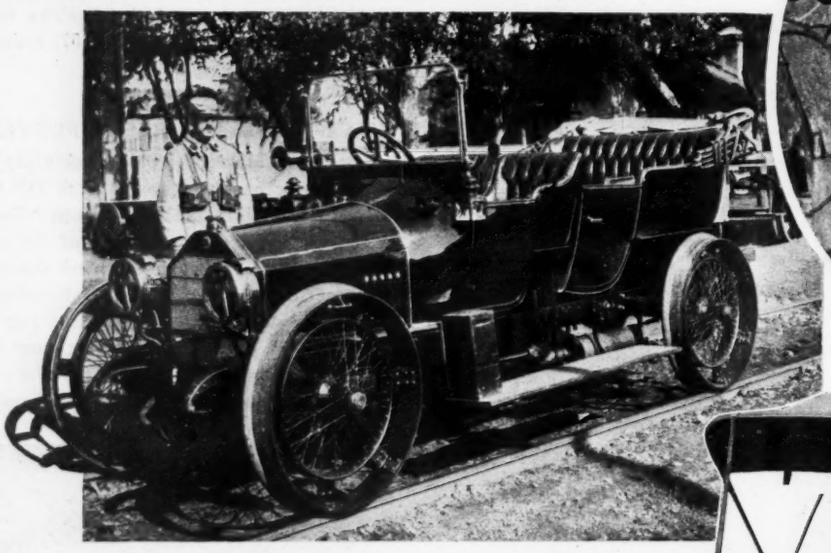
The work done by the Boy Scouts to bring to the pedestrians' att ention the value of walking with traffic instead of through it has brought about a change of attitude on the part of the public in Akron, Ohio

Men and Motor Cars on the Firing Line



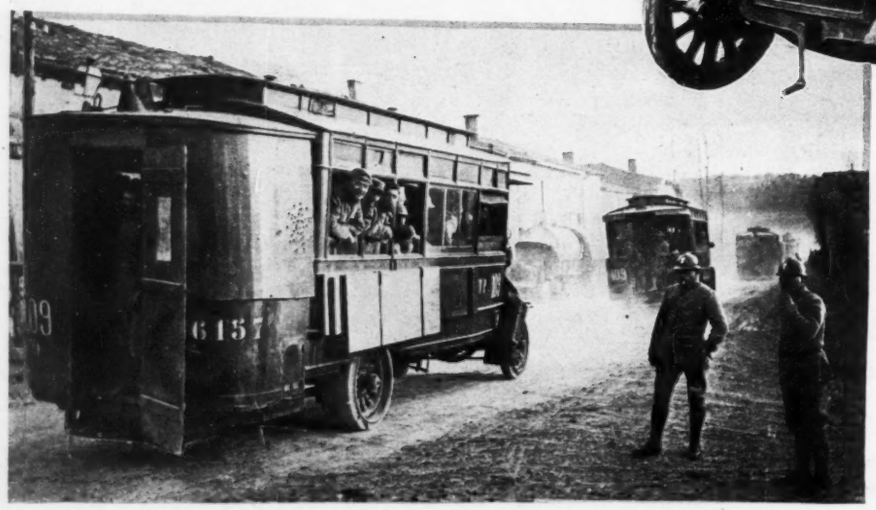
A Pierce-Arrow convoy meets the snow and mud of Northeast France

The army transport men adopted this 11-year-old boy who accompanies them to the batteries



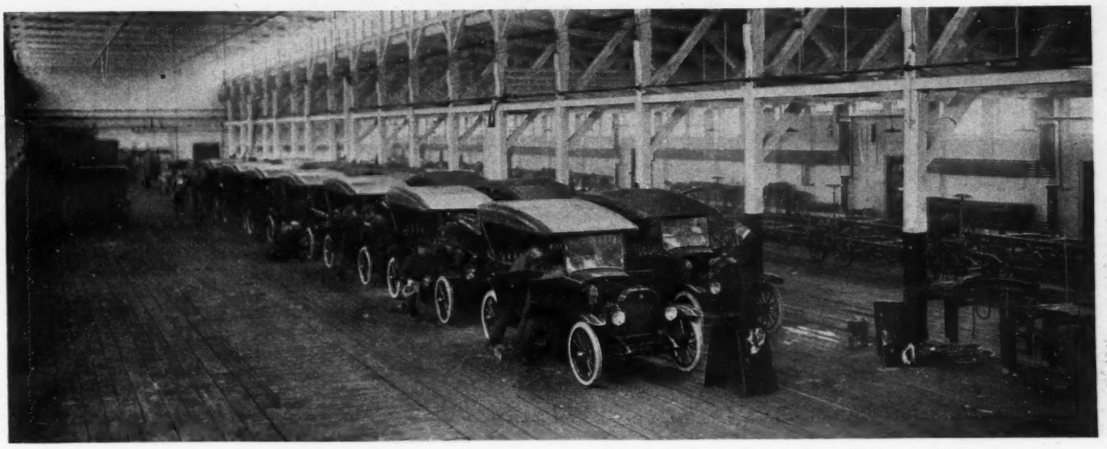
A general travels all sorts of ways in Europe, but the motor car shown above does, too. It belongs to General Sarroil and is fitted with flanged wheels for running on rails

After loading the truck with drinking water the drivers take it to the troopers at the front



Paris buses pass through Verdun with troops withdrawn from the firing line. Note the bullet marks and home-made rear door. The two gendarmes to the right are on traffic duty

AT HOME WITH THE EMERSON



View in Emerson factory March 1, showing sixteen cars being completed for shipment. These cars were not lined up for this photograph but were going through the normal course of production. They are being fitted with floor boards, speedometers and other equipment details. To the right is the assembly floor 180 ft. long

Visit to Factory Shows Company Assembling and Shipping Cars on Schedule of About Five a Day

KINGSTON, N. Y., March 1—To-day we visited the factory of the Emerson Motor Co. here to find out first hand exactly what this company is doing in the production of motor cars. We brought our own photographer and took the photographs which are reproduced herewith. Nobody connected with the Emerson organization had any intimation of our visit until we arrived. All the photographs taken were made according to our directions. There was not a single chassis or part moved into any position in order to make a good photograph. Everything was photographed exactly as it was. There was no cleaning up of the floor, no re-arranging of parts, no grouping of chassis on the assembly floor, no posing of workmen, everything was taken exactly as we found it. We wanted it to be that way so our readers might get a true picture of what is being done. Our artists have not done any retouching on a single photograph.

About Five Shipped Daily

We found the Emerson company assembling cars and shipping them on a schedule of approximately five a day. Sixteen complete cars were loaded on the freight cars to-day. Yesterday nine were shipped. Tuesday seven were shipped, and Monday seven were shipped. We were advised that 106 have been shipped to date. Outside of the factory we counted seven regulation motor car freight cars waiting to be loaded.

In the factory we were most concerned at seeing how production was moving along through the different departments. We found all told thirty chassis in different stages of construction, as follows: At the start of assembly were eight frames being fitted with axles, springs, etc.; on the progressive assembly floor with its two tracks for assembly were nine chassis in various stages of completion; in the chassis paint department were nine chassis being painted and fitted with tires; and four other chassis were completed, waiting to have bodies fitted on them.

We looked for bodies and found nineteen cars fitted with bodies and practically complete, ready for shipment. There were four bodies mounted on wheeled trucks, ready to be mounted on chassis; eight others were waiting to be taken out of the final varnish room; and thirteen others were waiting to be put in the varnish department. The company advised that it is getting its bodies from the Middle West and is having much difficulty with railroad shipments.

Looking around for other indications of stock to go into chassis we found the following: Rear axles, 230; front axles, approximately 150; frames, forty-four; springs, 600; mufflers, twenty; radiators, twenty-six; propeller shafts, forty; starting and lighting equipment, twenty. In addition there were small groups of other components in different places in raw stock room, finished stock room and in different parts of the assembly floor. There were eleven engines on the assembly floor which had just been received and were being uncrated. We were advised that engines were arriving at the rate of six a day, which is only at half the rate the company needs them.

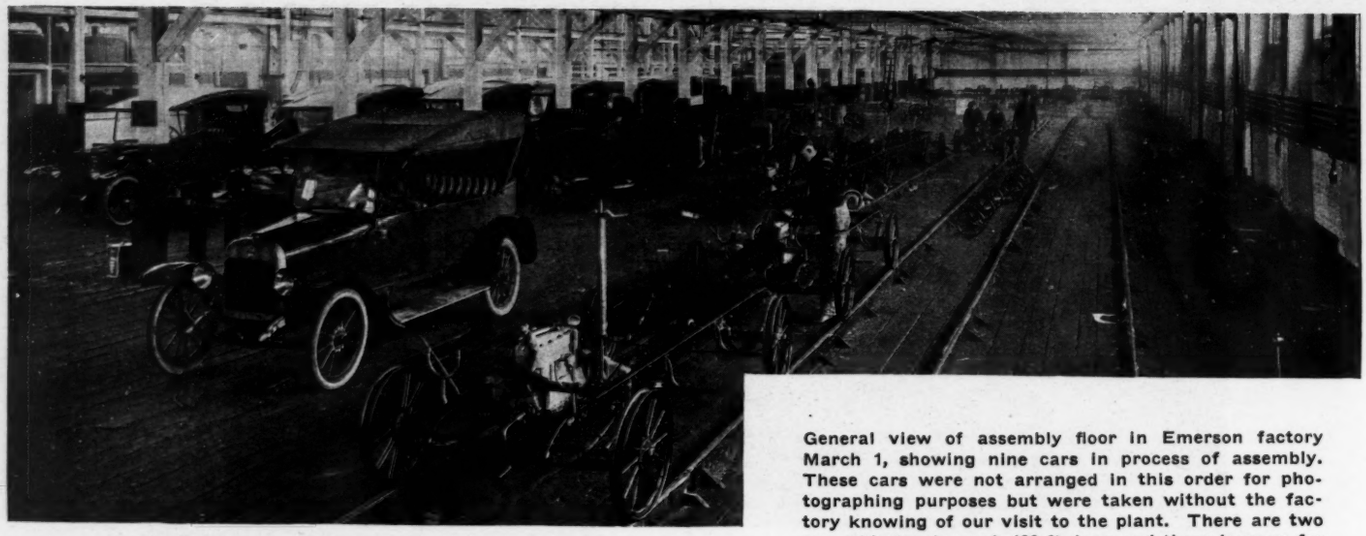
Throughout the factory we found activity in practically all departments along the percentage that you would expect in a factory producing and shipping five cars a day on an average. Thirteen workmen were engaged on chassis assembly; twenty were working on finishing cars for shipment; four were in the chassis paint department; three were working in the paint and varnish; there were five in the sheet metal department; eight were in the machine shop; and we did not have an opportunity of counting the number engaged in unloading, working in the raw stock department, in the finished stock department and in the primary chassis assembly. There were others engaged in loading cars, several in the engineering department and in other miscellaneous departments.

Machinery Equipment Paid For

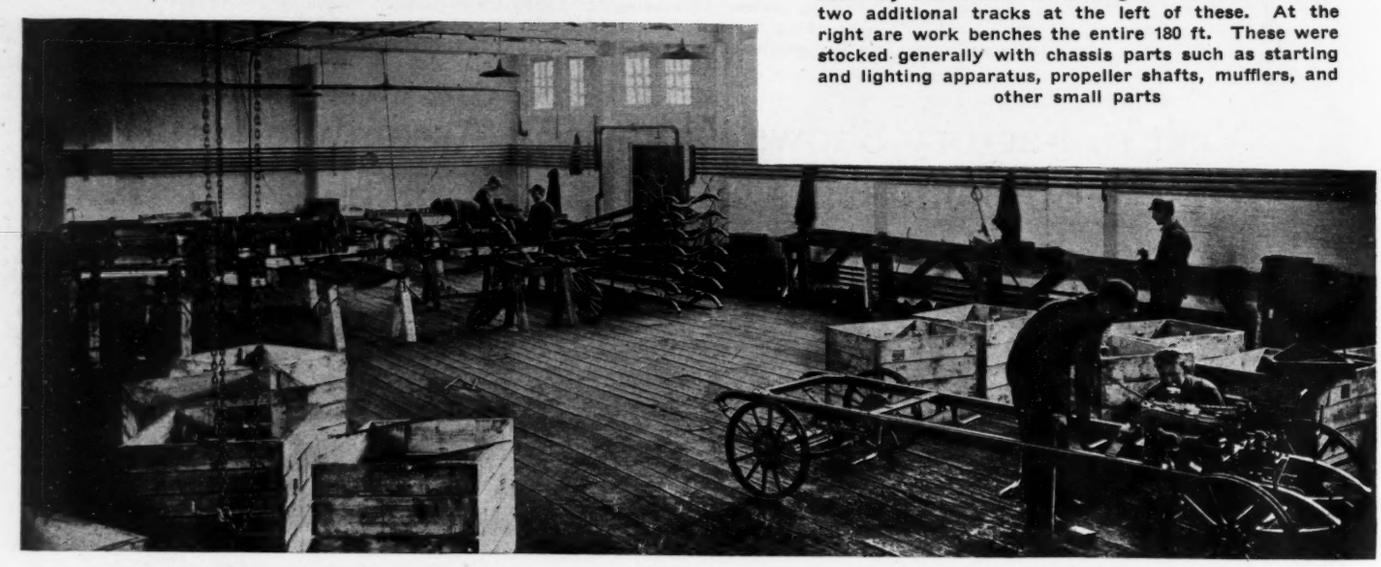
The factory is roughly T-shaped with the vertical part 317 by 152 ft. and the cross part 280 by 70. The cross part is the machine shop, which is modern in every respect. It has been fitted with a cement floor, and a new addition measuring 90 by 70 ft. has been added by the Emerson company. The machinery equipment, worth $28,000, has been bought and paid for by the machine shop, and $32,000 worth of additional machinery ordered, which will be installed in 60 days.

The company contemplates manufacturing a great many of its own engines and has in process of manufacture $35,000 worth of tools and jigs for engine manufacture. Already $12,500 has been paid on this item. The company at present has arranged for the manufacture of 1500 engines. It expects to begin the manufacture of its own engines in July. At present the

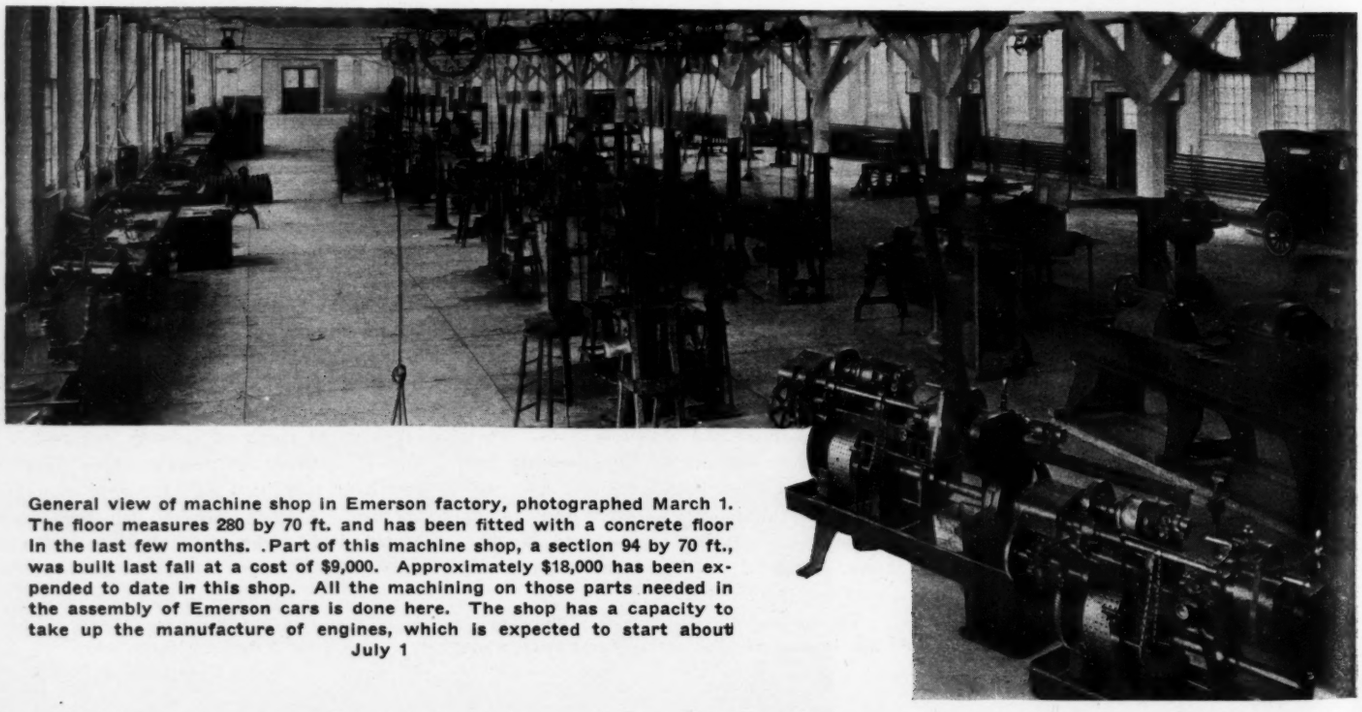
(Continued on page 44)



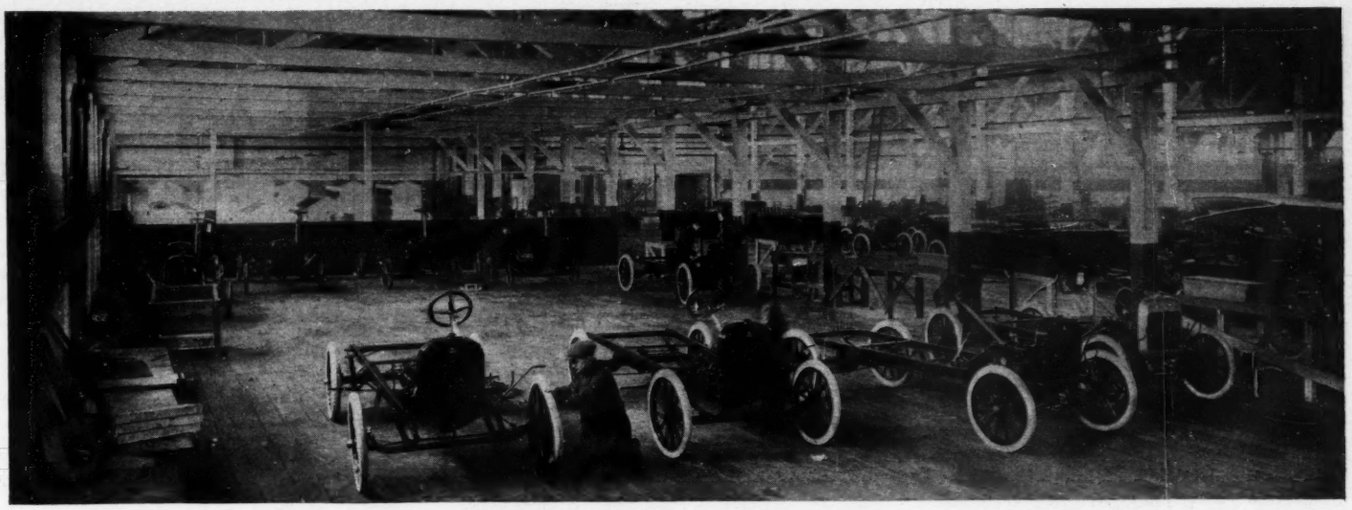
General view of assembly floor in Emerson factory March 1, showing nine cars in process of assembly. These cars were not arranged in this order for photographing purposes but were taken without the factory knowing of our visit to the plant. There are two assembly tracks each 180 ft. long and there is room for two additional tracks at the left of these. At the right are work benches the entire 180 ft. These were stocked generally with chassis parts such as starting and lighting apparatus, propeller shafts, mufflers, and other small parts



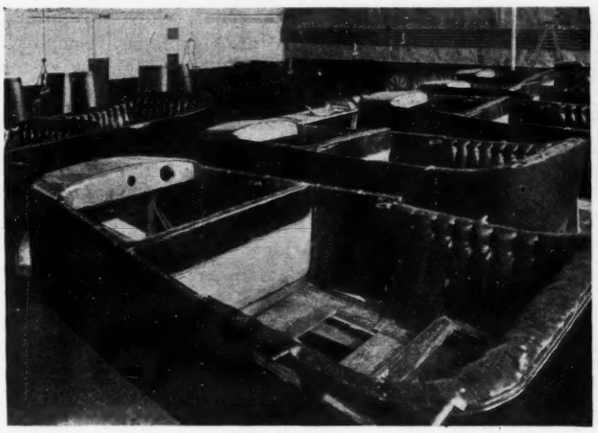
Rear end of Emerson assembly floor, photographed March 1. This shows seven chassis in the early stages of assembly. This space is at the end of the progressive assembly floor. Here the frames are started and the addition of springs and axles made. In the foreground the engine has been dropped into position. This done, the car is moved onto the pregressive assembly floor



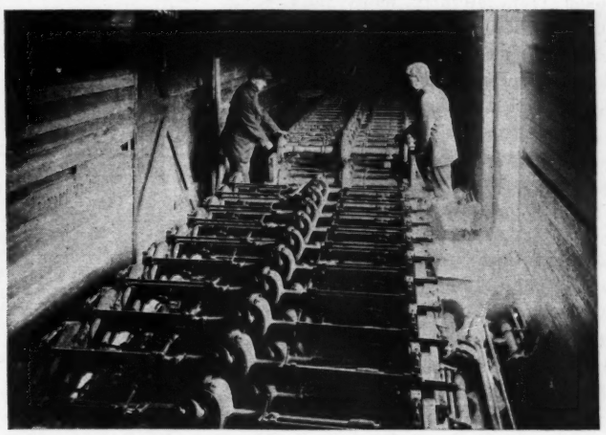
General view of machine shop in Emerson factory, photographed March 1. The floor measures 280 by 70 ft. and has been fitted with a concrete floor in the last few months. .Part of this machine shop, a section 94 by 70 ft., was built last fall at a cost of $9,000. Approximately $18,000 has been expended to date in this shop. All the machining on those parts needed in the assembly of Emerson cars is done here. The shop has a capacity to take up the manufacture of engines, which is expected to start about July 1



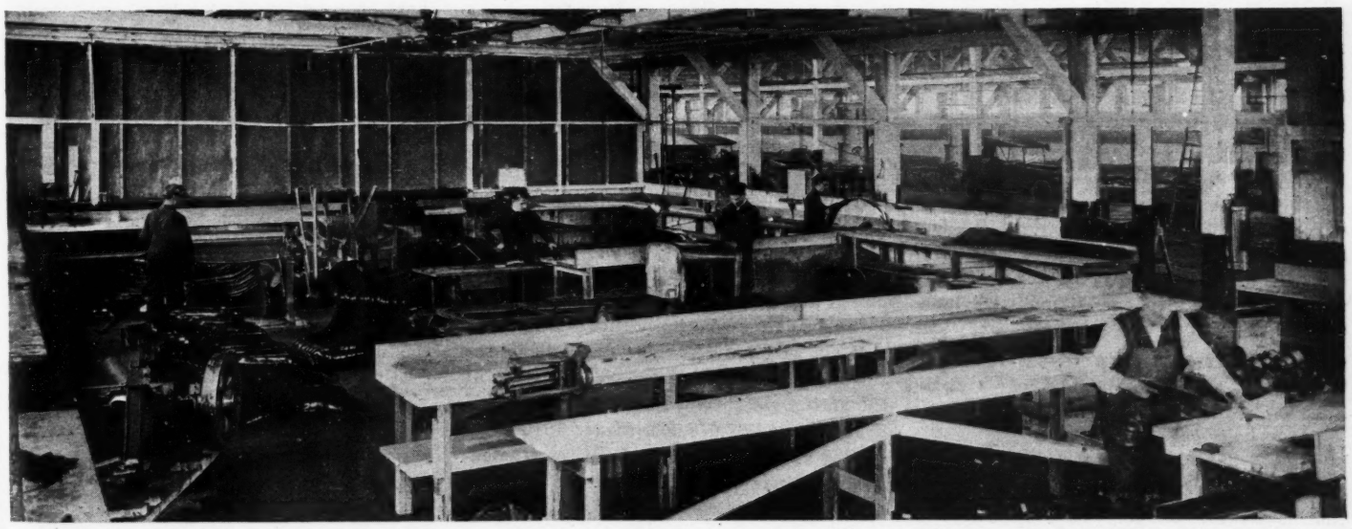
Chassis painting department of Emerson factory March 1. This shows nine chassis completed, being painted, and fitted with tires, preparatory to being moved into the department where the body is added



Body painting department in Emerson factory, photographed March 1. Nine bodies were drying the final finishing coat. One hundred and seventy-five wheels were being dried and 150 others ready for spraying. There were no other parts such as fenders, hoods, etc., going through



Photograph taken at Emerson factory March 1, showing interior of freight car filled with rear axles which were being unloaded. The car contained over 150 axles. Just beside it on the Emerson siding was another car which had arrived some days before this day with springs



Sheet metal department in Emerson factory, photographed March 1. In this department, 70 by 90 ft., work has been going on for some time. Some of the fenders are being manufactured here, as are the hoods. There was in the department appriximately 65,000 lbs. of sheet metal ready for use. The machine equipment included a rolling machine for fenders, one sheet metal cutter, one punch ready to be installed, a beading machine and one or two minor machines

To Spend Millions

FOR SOUTHERN ROADS

Sixteen States of Division Can Get $3,500,000 for Highways Through Federal Aid Alone

WASHINGTON, D. C., March 3—The Southern states are to build many roads this year. As it is, the total annual public revenues spent for road and bridge construction in the sixteen Southern states increased from slightly more than $21,500,000 in 1904 to about $52,500,000 in 1914, according to statistics just published by the U. S. Department of Agriculture, and Jan. 1, 1915, they had outstanding more than $77,000,000 in road and bridge bonds, state and local.

The road mileage at the close of 1914 was 814,567. There were about 73,600 miles of surfaced roads. The greatest road development that year was in Kentucky. There 21.4 per cent of the total road mileage was surfaced.

1917 to Set Record

This year all past figures will be surpassed, and naturally, in view of the federal aid now available. The Southern states will receive $1,704,928 from this source, which they will have to match, of course, making $3,500,000 as a starter. In addition, money has been voted by counties, cities and raised by subscription to aid special projects. Here, briefly, is what the states are doing:

Alabama—State expenditures estimated at $1,162,000 and county work at $2,000,000.

Arkansas—State 3-mill tax estimated at $1,500,000. This does not affect the $8,650,000 project, about one-half of which has been completed.

Florida—State revenue estimated at $1,500,000 and local work at $2,600,000. Florida has been working at road projects several years, and the roads recently constructed are estimated to have cost $17,000,000, most of them being tourist highways or projects in connection with land reclamation.

Georgia Makes Estimate

Georgia—Estimates of this year's work are equal to the expenditures of last year, about $5,000,000.

Kentucky—Work is planned to cost about $3,000,000, which is $500,000 more than last year.

Louisiana—The legislature has under consideration a project that will require about $25,000,000 and will carry out a statewide road project. New Orleans has

Bonds Are Voted

voted $500,000 to perfect terminals to the several national highways that end in the city.

Maryland—This year $5,350,000 will be available. It will go toward carrying on work that in recent years has cost $18,000,000.

Mississippi—More than $3,000,000 is assured for road work. Much of this is from counties completing cross state highways. One county has voted $900,000 in bonds.

Missouri—The state good roads bill has been passed by the legislature, and for the first time a state unit plan will be at work. Including the $3,000,000 voted by St. Louis county but now tied up by litigation, there will be more than $6,000,000 for work planned.

North Carolina—Work costing $6,000,000 under way. This follows expenditures estimated at $5,100,000 last year.

Million in Oklahoma

Oklahoma—The state department has $500,000 for new work and $250,000 for maintenance. Bonds and local subscriptions are being arranged over the state, the lowest estimates being $1,000,000.

South Carolina—The road sentiment is just getting under way. Some bonds have been voted, but figures are hard to obtain.

Texas—The work for 1917 is estimated at $40,000,000 on a basis that plans are twice as large as last year, when $20,000,000 was expended. Of the 258 counties, 203 are pushing road work.

Virginia—Engineers estimate this year's building at $2,240,000 and maintenance at $700,000. Last year's building is estimated at $1,600,000. Reports are of sixty-seven bridges to be built this year.

West Virginia—Various districts in the state are voting on $2,525,000 of bonds at the spring elections. Last year authorized bonds totaled $7,678,500. Since 1912 work costing $13,280,000 has been completed. Road work is expensive and slow because of the mountains.

BIG MOTORIST GATHERING

Memphis, Tenn., March 2—The good roads committee of the Business Men's Club Chamber of Commerce is planning to entertain several thousand motorists from Alabama, Tennessee, Mississippi and Arkansas during March and April at several meetings to be held here for the purpose of discussing projected highways. When the various routes which have already been organized are completed, Memphis will be the hub of a great highway system. On April 5 and 6, the Jefferson Davis Highway Association will meet and motor drives will be held from Paducah, Ky., and Jackson, Miss., the extremities of the route.

During the Harahan bridge celebration, to mark the opening of the $2,000,000 railroad bridge, which will have driveways by which Arkansas and Tennessee will be linked, the Southern National highway and the Muscle Shoals highway organizations will meet and drives will be held for both of these events. The Southern National highway is to run from Washington to San Diego, Cal., through Memphis, Little Rock and Dallas.

The committee will issue on April 1 a route book showing the best routes to every Southern city from Memphis. There will be 10,000 copies issued.

The route for the Memphis-Springfield, Mo., branch of the Ozark Trails will be selected at a meeting to be held at Jonesboro, Ark., from May 1 to 3.

MIDLAND TRAIL BOOSTERS MEET

Ashland, W. Va., March 2—About 400 good roads enthusiasts of West Virginia and Kentucky attended the bi-state meeting of the Midland Trail Association at Ashland, W. Va. Brief addresses were made by Dr. R. R. Elmore, Louisville, Ky.; Gov. W. A. McOrole of West Virginia; Eugene Stuart of the Louisville Automobile Club; Rodman Wiley of Frankfort, Ky., and others. Governor Stanley of Kentucky was unable to be present. A banquet was held for the visitors at the Elks' Club.

USED CAR CASE DEBATED

Louisville, Ky., March 1—If a movement initiated night before last is carried through, Louisville dealers will cease making large allowances for used cars when new ones are purchased. Fifty-two men, proprietors, members of retail firms and salesmen met at the Seelbach and dis-

cussed the problem of the used car, the concensus at the close of the discussion being that local dealers have been entirely too liberal.

The meeting was called by W. A. Thomas, the motor car men being invited to hear F. W. Gottlieb, of the Chicago Automobile Trade Association. Mr. Gottleib discussed the evils arising from taking old cars in partial payment for new ones and advocated the use of regular market reports, such as are published by the Chicago Automobile Trade Association. This association gives market reports for different zones in the country, basing its reports on the average allowance made for cars in the different sections. The system explained by Mr. Gottleib seemed to find favor with the Louisville dealers.

"Allowances made for used cars actually have amounted to more than the dealer's profit in certain instances in Louisville," Mr. Thomas said. "And it is not an infrequent occurrence for a dealer who makes, say, $300 on the sale of a new motor car to allow $300 on the sale of a new car, in consequence of which his entire profit is tied up in the old car. And then he sometimes has to sell the old car for $250, thereby cutting his profit $50. This is not only a loss to the dealer, but in many instances a clear violation of the ethics of the trade, where motor cars are supposed to be sold for certain fixed prices."

The prevailing sentiment among the dealers taking part in the meeting was favorable to the formation of a new dealers' organization, which will be entirely distinct from the Louisville Automobile Dealers' Association. Another meeting will be called soon at which the same phase of the motor car business will be discussed more thoroughly, Mr. Thomas said, and the motor car salesmen of the city will be invited.

CHEVROLET SURPLUS GROWTH

New York, March 2—The Chevrolet Motor Co. during 1916 showed an increase in its surplus of $29,469,588, largely through the acquisition of stock of other companies. This increase is equal to 46.04 per cent on the $64,004,800 stock. Among the investments were 450,000 shares of common stock of the General Motors Corp. The net income from operations was $7,095,071, and current additions to surplus from the stock secured in the other companies, $22,374,517. The profit and loss surplus at the close of the year was $31,123,274. Approximately 77,000 cars were sold during 1916. This compares with 11,888 in the 4½-month period in 1915.

The balance sheet shows an increase in real estate, plant and equipment from $13,811,590, in 1915, to $17,058,269, while cash decreased from $4,192,968 to $3,981,784.

The capital stock of the company was increased during 1916 to $64,004,800 against $19,752,300 in the preceding year.

'16 Exports Lead '15

Sale of 80,050 Motor Vehicles Abroad Was Despite Unexpected Obstacles

Increase in Value Amounted to $1,711,468

NEW YORK, March 3—Last year the American motor car industry maintained its record of expanding despite unexpected obstacles. During the year Great Britain and Italy prohibited the importation of motor cars, and France raised the duty on them to 70 per cent. Freight congestion at Russian ports made it almost impossible to ship cars and trucks to that country except for government use. At the same time ocean freight rates were abnormally high and cargo space to Europe and the Far East very difficult to get. But despite these obstacles the United States exported last year 80,850 motor vehicles, the value of which aggregated $96,595,861. This was an increase of 16,892 vehicles over 1915 and an increase in value of exports for the year of $1,711,468.

There was a decrease in exports of trucks from 22,094, valued at $59,839,303, in 1915, to 18,903, valued at $52,870,774, in 1916. But the shipments of passenger cars to foreign countries increased from 41,864, worth $35,045,090, in 1915, to 61,947 cars, worth $43,725,087, last year.

In addition to complete vehicles parts were exported to the value of $24,001,060; tires, $15,211,943; and motor car engines, $2,480,650, making a grand total of $138,289,514 as compared with $125,306,568 the previous year.

France was the largest buyer, paying $23,279,846, mostly for trucks. England's purchases, amounting to $17,083,616 and also mostly for trucks, were only half as large as in 1915. Sales to all other European countries decreased from $22,490,725 in 1915 to $14,519,483 last year. European Russia was the third most liberal customer in Europe, taking $8,546,563, representing government purchases almost exclusively.

Canada took $8,965,200 worth of cars, very nearly double her 1915 purchases and almost equal to the purchases of all the rest of the Western Hemisphere combined.

The Antipodes was a fine market, also. Australia spent $5,727,233 for our cars; the British East Indies, $3,359,379; and other Asia and Oceania, $10,842,305. The other side of the globe is a better market than the new world exclusive of the United States and ranks second only to Europe. This is due chiefly to the fact that it is peopled largely by persons of European nativity or descent, principally speaking the English language.

OHIO ROADS SITUATION

Columbus Ohio, March 2—Whether the good roads movement in Ohio is to progress at the rate it has maintained the last few years is dependent largely on adoption of measures in the legislature, proposed by Senator White, Sandusky, and Representatives Mulchay of Henry and Guthery, Marion, according to W. A. Alsdorf, secretary of the Ohio Good Roads Federation.

"These bills embody the recommendations of the federation and will bring about corrections in the Cass road law to which this organization has given much attention for several months," Mr. Alsdorf said. "The general purpose of the law is in the right direction but because of the many amendments offered the day it was enacted the measure was rendered indefinite, inoperative and confusing in many of its provisions."

Representative Guthery's tax measure, which would provide a degree of relief to all taxing units and yet hold intact the principle of the Smith law, has been indorsed by the federation.

WOULD BOND OWNERS

York, Pa., March 2—A bill has been prepared by Representative Duncan Sinclair of Fayette county for introduction in the House of Representatives, which will require every owner of a motor car or truck to file a $2,000 bond when he applies to the state highway department for a license, operators and chauffeurs being required to do the same thing. The bond would be given in the name of the state and require approval by the court of the county where the owner, operator or chauffeur resides.

Under the terms of the bill the bond would be used for the benefit of any person obtaining judgment for injury caused by the motor car and the highway commissioner, when notified of a finding, would certify the bond to the notary of the county so that collection could be made upon proper order of court. The bond would remain in force until its whole amount was exhausted and could remain good in part in case a verdict did not amount to the face of it.

IMPROVES N. O. T.

Columbia, Mo., March 3—Work to remove the Mineola Hills, the big obstacles on the Old Trails route from St. Louis to Kansas City, of which Columbia is a halfway point, has begun. The deeds to a new route have been obtained in the Montgomery County court; a survey has been made; telephone poles have been moved and reset. The leveling of the route will begin with the going of frost.

For five years Montgomery County has been trying to get rid of these hills. The route is beautiful and picturesque, being an important scenic part of the trails between the two Missouri cities. The road is to be hard-surfaced for 8 miles. As limestone is abundant in that region, the cost is estimated at a lower cost than usual. The state will be asked for a rock crusher and convict labor.

Cleveland Makers Add

Sixth City Concerns Provide New Manufacturing Facilities

CLEVELAND, Ohio, March 2 — Cleveland makers of cars and parts here are erecting new buildings, increasing mechanical equipments, adding to their working forces and operating in many ways to care for rapidly growing business.

The White Co. is completing a new four-story building, which will be used for assembling and finishing cars, and is receiving orders at the rate of 10,000 cars a year. The company is attempting to operate at full capacity but is hindered to some extent by the freight car situation which produces a lack of materials.

Winton at Full Capacity

The Winton Co. plans to produce 3000 cars this year and is now operating at that capacity, with orders which forecast a demand for more cars than the company will produce. The Winton company does not seek business for more than its schedule, as it makes each car a special order and does not believe that high grade special work can be turned out sucessfully if the shops are crowded beyond a normal and healthy capacity.

The Chandler Motor Car Co. has completed a new four-story building 500 ft. long for enameling, assembly and body work. The present capacity is 130 cars a day, an increase of 300 per cent over last year, but it is now producing between eighty and ninety cars daily because of freight conditions.

The Jordan Motor Car Co. is starting the erection of a new structure to contain 30,000 sq. ft. of floor space, which will duplicate the present plant, thus doubling the company's floor space. The new building is intended to further increase the quality of the company's product rather than its capacity. At this time the Jordan company is making ten cars daily and anticipates this figure will be maintained throughout the year.

Growing Car and Parts Business Is Reason

The Grant Motor Co., which recently moved into its new and enlarged quarters from Findlay, Ohio, is operating at full capacity. It is producing fifty cars a day, which is 100 per cent more than the Findlay capacity, and is finding a demand for every car. Freight conditions threaten to cut the production to forty or forty-five cars a day, as materials are becoming more difficult to obtain each day.

The Willard Storage Battery Co. is completing several buildings in its new plant and will be ready to operate at full capacity by May 1. The company is making 4000 batteries a day and will be able to turn out 6000 a day when these structures are finished. The new plant comprises nine buildings with 1500 employes and covers 10 acres of ground with 240,000 sq. ft. of floor space. The company has installed many improved methods and layouts and increased its capacity 35 per cent without employing more workers.

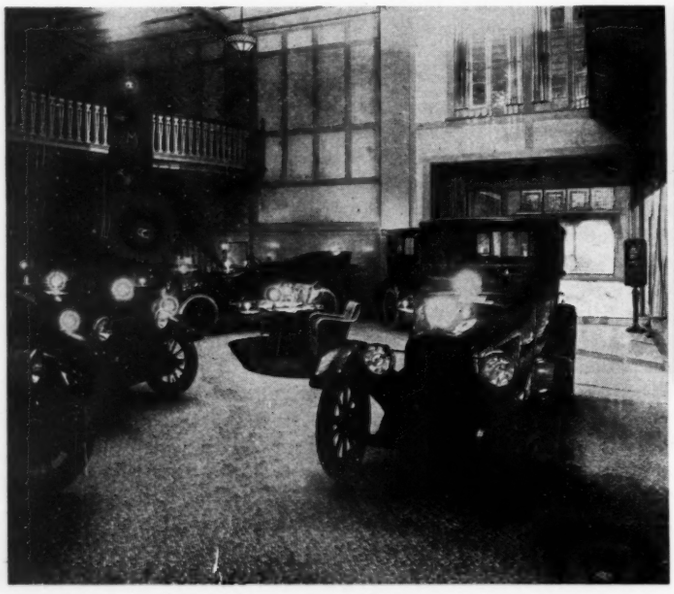
New Dann Products Plant

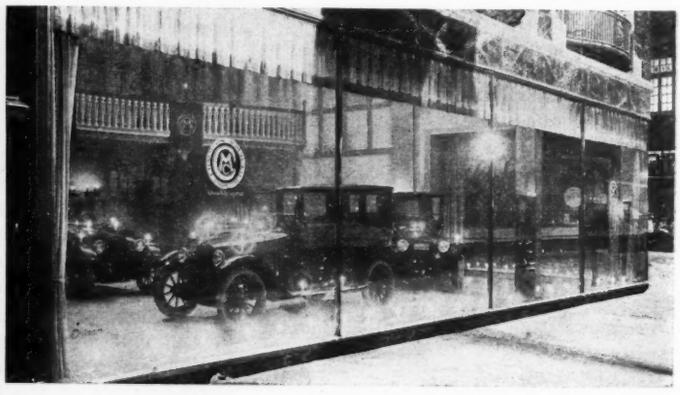
The Dann Products Co., maker of Dann spring inserts and other motor car accessories has moved into its new plant, where it has a capacity twenty-five times that it had in Chicago. The company is operating 16 hrs. daily at full capacity. The plant, which has 30,000 sq. ft. of floor space, is in the heart of the new manufacturing district, where the Chandler and Jordan companies have their factories. Special machinery was required for the manufacture of Dann products, and the company has manufactured practically all its own patterns, dies and castings and equipped its shops with tools of its own make.

WILL MAKE SPARK RETARDER

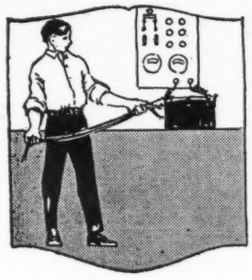
LaPorte, Ind., March 3—An automatic spark retarding device is to be the principal article to be manufactured in a general line of accessories by the Bill Mfg. Co., of this city, which has just been incorporated with a capitalization of $10,000. Directors of the company are all connected with the Three-Way American Prism Co., being J. J. Ohlis, F. A. Flocken and C. D. Hutnut. William W. Bauch, foreman in the plant, is the inventor of the device, which is adapted especially for Ford cars and is designed to prevent accidents while cranking the car. The device is such that when a car is being cranked, it automatically retards the spark, and when the motor starts the device advances the spark automatically.

World-Old Light on Twentieth Century Product





L. J. ROBINSON, Detroit and Michigan distributor for the Chalmers Motor Co., doesn't believe in hiding his light under a bushel regardless of the local shortage in illuminating power. When the Edison Co. sent forth its appeal to Detroit merchants to eliminate extravagant consumption of electric power, he was the first to respond. For a week or more the Robinson establishment has been illuminated by several hundred wax candles. Half a dozen sales have been traced to the candle illumination, he says



Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.

Editor's Note—Herewith is presented the thirty-fourth installment of a weekly series of articles begun in MOTOR AGE *issue of June 29, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the Class Journal Co., Chicago, in a size to fit the pocket conveniently.*

Part XXXIV—Motor and Engine Connection—Clutches and Pinion Shifts

THE operation of the overrunning ratchet-and-pawl type of clutch may be understood easily be reference to Fig. 198. Four pawls are attached to a plate, which in turn is fastened to the crankshaft or shaft that is to be driven. These four pawls engage teeth cut in the inner periphery of a ring which is the driving portion of the clutch. One, or perhaps two, of the pawls will be engaged with the teeth when the engine is at rest, due to the action of their counterweights. The two pawls marked A and B are engaged at the position shown in Fig. 198. Power is transmitted from the starting motor through the outer portion, or ring, to the plate on which the pawls are mounted as long as any one of the pawls is engaged with the teeth. Just as soon, however, as the speed of the plate exceeds that of the ring the pawls are disengaged and held away from the teeth by the centrifugal force acting on their counterweight. To prevent the pawls from suddenly re-engaging when the engine comes to a stop and rocks back and forth, a second set of pawls is provided, and they are shown at E, F, G and H in the figure. When the clutch is inoperative or idle all this second set of four pawls fall into their lowest position. Just as soon as the plate on which they are mounted rotates they are thrown out to a radial position, as shown by the position of the one marked H. If the plate happens to start to revolve in the opposite direction, the inertia of the four smaller pawls throws them into the position shown by the one marked G, which prevents the main pawls engaging the teeth. When the plate on which the pawls are mounted comes to a complete stop at least one of the main pawls will fall into a correct position for starting.

The Hartford starting motor is connected to the engine by a friction clutch and worm-and-worm gear as shown in Fig. 199. When the starting switch pedal is depressed the electrical connection between the motor and battery is completed, and at the same time a strong pull is produced on the lever attached to the end of the rod P, which transmits a strong pull on the friction clutch mounted in the flywheel of the motor and thus connects the motor to the engine.

Non-Automatic Pinion Shift

The fundamental principle of the non-automatic pinion shift is shown in Fig. 200. When the switch rod is moved to the starting position it operates the switch and connects the motor to the battery and at the same time causes the sliding pinion to become engaged with the gear on the flywheel. The overrunning clutch mounted in the intermediate gears prevents the engine from running the starting motor at an excessive speed. Just as soon as the switch rod is restored to its normal position both the starting switch and sliding pinion are restored to their normal position.

Another good example of the non-automatic pinion shift is found in certain installations of the Westinghouse Electric & Mfg. Co., shown diagrammatically in Fig. 201. In the non-automatic mechanical pinion shift of the Westinghouse company, a starting pedal is mounted on the foot-board, or a lever is mounted conveniently for hand operation. The operation of the system thus controlled can best be understood by reference to Fig. 201. The contact-making part of the switch is shown in this diagram mounted on the gear-shift rod.

At A is the "off" position of the shift pinion and switch con-

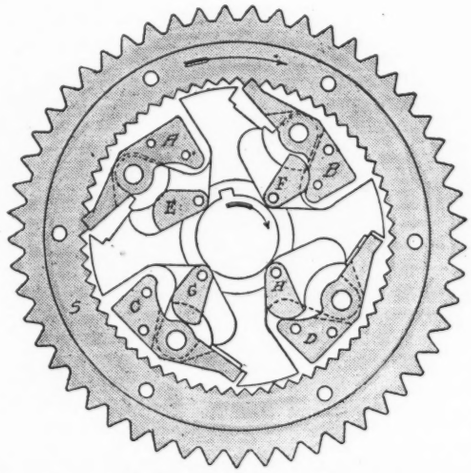


Fig. 198—The operation of the overrunning ratchet and pawl type of clutch is explained by reference to this drawing

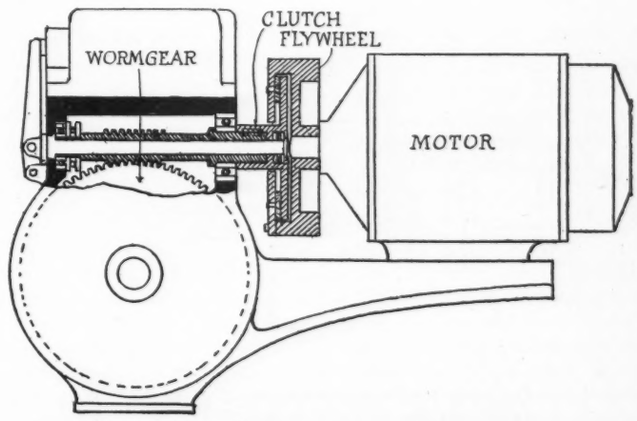


Fig. 199—Friction clutch and worm-and-worm gear which connects Hartford starting motor to the engine

tactor. Pressure on the starting lever moves the shift rod first to the position shown in B, closing the motor circuit at P and P_1 through the resistance R; this starts the motor at low speed. Further motion of the shift rod to position C opens the electric circuit, but the motor and pinion continue to turn, owing to their momentum. When the position C is reached, the pinion still is turning slowly so that it cannot fail to mesh with the gear; but as power is turned off the motor, there is no difficulty in sliding the teeth into full engagement. As soon as the teeth do engage, further foot pressure on the starting lever shifts the rod to the position shown in D, closing the electric circuit at Q after the pinion and gear have meshed a sufficient distance to present a good bearing length on the teeth. This connects the motor directly to the storage battery so that full power is impressed, turns over the engine until the starting lever is released or the engine picks up on its own power. There is an over-running clutch between the flywheel pinion and the motor, so that if the pedal is not promptly released when the engine picks up, the motor is not driven by the engine. When the pressure is removed from the starting lever, the shifting-rod springs return all parts to position A. This releases the gears and opens the electric circuit, and the motor comes to rest.

The pinion is meshed with the gear on the flywheel in the Bijur system as applied to the Hupp motor car by pressing the starting pedal, and by a further movement the starting switch is closed. Four stages in the operation of starting the engine are shown in Fig. 202. No overrunning clutch of any kind is used in this particular system, and for this reason the motor should be disconnected from the flywheel just as soon as possible after the engine starts to fire.

Automatic Electromagnetic Pinion Shift

The starting motors the Westinghouse Electric & Mfg. Co. used in this application are composed of three principal parts; the stationary parts, or field; the rotating parts, or armature and shaft; and the shifting magnet. The armature is mounted on a hollow shaft; on the end of this shaft is mounted a splined pinion which drives the engine flywheel. The pinion is made to slide along the shaft by a shifting rod which is attached to the pinion and passes through the hollow shaft. The other end of this shifting rod acts as the core of the shifting magnet. When the motor is not revolving, a return spring holds the pinion at the end of the shaft and clear of the flywheel gear.

As shown diagrammatically in Fig. 203, when the starting switch is closed a circuit is complete from the negative terminal of the battery through the switch, the shifting magnet, the armature and the series field of the motor to the frame of the car and through this to the positive terminal of the battery. The motors used in this application are of the series type; that is, the field is connected in series with the armature so that all the current flowing through the one also flows through the other. One of the characteristics of this kind of motor is that the amount of current flowing through it is proportional to the amount of energy it develops.

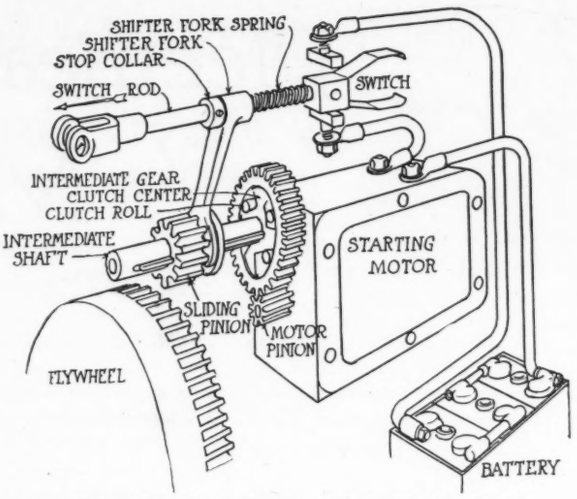


Fig. 200—Drawing to illustrate fundamental principle of the non-automatic pinion shift

When the starting switch is closed, current flows through the circuit as noted above, causing the armature and shaft and the pinion to rotate. The motor requires a high current at the instant it starts from rest. This high current, through the shifting magnet, energizes it sufficiently to overcome the force of the return spring and therefore draws the shifting rod through the shaft, thus sliding the pinion into mesh with the gears on the flywheel. The teeth on the flywheel and the pinion are cut diagonally so that they mesh very easily. As soon as the pinion meshes with the flywheel gear, the current required to turn the engine over is enough to hold the pinion in mesh until the engine fires. When the engine picks up it soon runs at higher speed than that of the motor.

When the engine speeds up so that its speed approaches the no-load speed of the motor, the current in the latter falls off so that the pull of the shifting magnet is less than that of the return

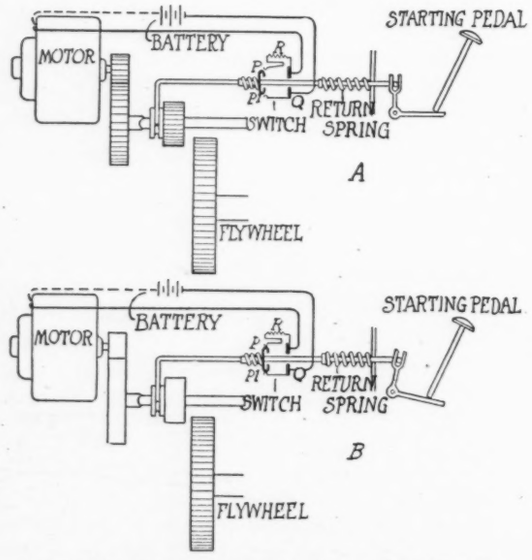


Fig. 201—Westinghouse system—A gives the "off" position of the shift pinion and switch contactor; in B the motor circuit is closed and the motor starts at low speed

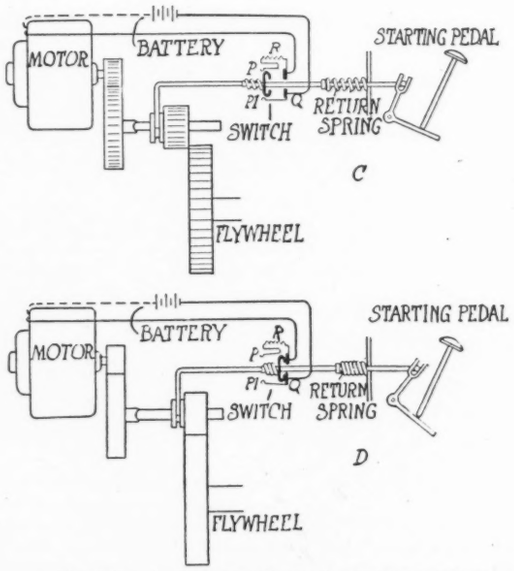


Fig. 201—At C the teeth can be slid into full engagement, after which the motor connects directly with the storage battery and the engine is turned over. D

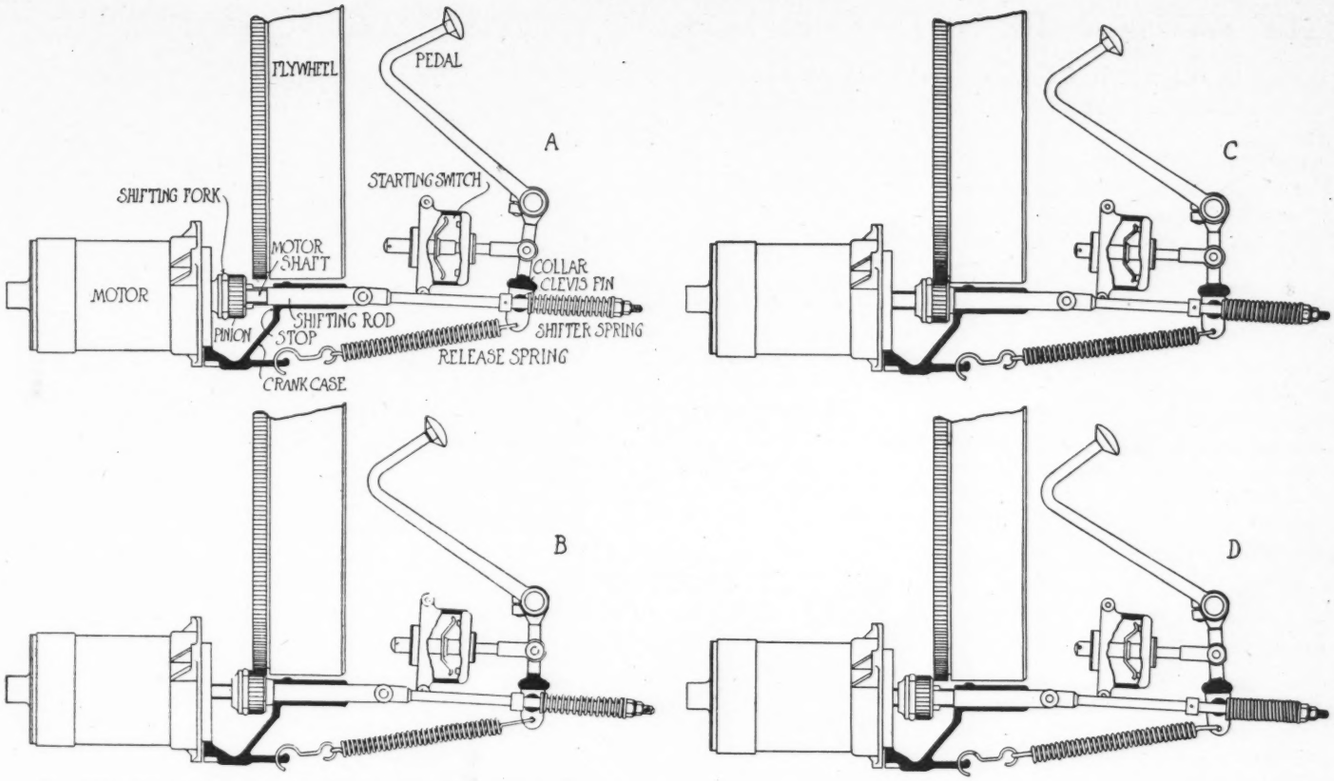


Fig. 202—Bijur system—as applied to the 1916 Hupmobile —A, out of action, starting switch off, pinion against motor head; B, about to crank, gears have meshed, but switch has not made contact

Fig. 202—C, cranking, note cap between collar on shifting rod and clevis pin—shifting fork is against stop, and shifter spring is compressed slightly. D, about to crank, when gears are not meshed, teeth are butting but switch has made contact. Shifter spring is compressed strongly, ready to draw pinion into mesh

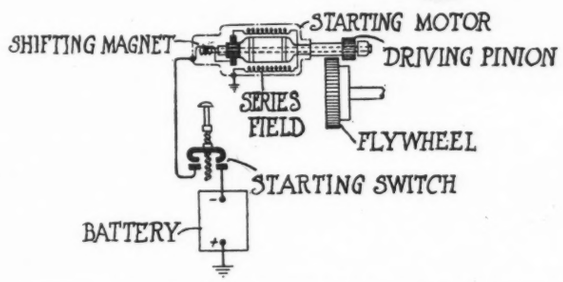


Fig. 203—At left—Here the closing of the starting switch completes a circuit between the terminals of the switch

spring, which therefore throws the pinion to its original position clear of the flywheel. The motor will continue to revolve, without load, however, until the starting switch is opened or released; but the pinion remains out of mesh, because the current required to turn over the motor is not enough to energize the shifting magnet sufficiently to pull the pinion back into mesh against the force of the return spring.

Akron, Ohio, March 3—The Miller Rubber Co. will offer its common stockholders 5000 shares of new common stock pro rata at par. The Miller is the third rubber company to increase its capital within the last week. Goodyear Tire & Rubber Co., Firestone Tire & Rubber Co., and Miller Rubber Co. are now all refinancing and offer a total of $14,870,000 par of new stock.

St. Louis, Mo., March 5—The Dorris Motor Car Co. announces an increase of capital from $30,000 to $1,000,000 and the election of W. R. Colcord as president to succeed H. B. Krenning, founder of the company. Mr. Krenning will retain an interest in the company but plans to retire. He was elected president when the company was organized in 1905.

Mr. Colcord is a native St. Louisan and has been president of the Colcord-Wright Machinery & Supply Co., which office he will resign to devote his attention to the Dorris company. Other officers of the company are: George P. Dorris, vice-president; Webster Colburn, treasurer; A. C. Schmid, secretary. I. C. Huckermann, president of the Polar Wave Ice & Fuel Co., and Frank C. Thompson, president of the Carondelet Foundry Co., have been added to the board of directors.

Capital Increases

Akron, Ohio, March 3—The Firestone Tire & Rubber Co. is issuing $5,000,000 worth of 6 per cent preferred stock, making a total capitalization of $10,000,000 with 6 per cent preferred with a par value of $100 and 300,000 shares of common stock with no par value. The new issue has been underwritten by the Cleveland Trust Co. and will be offered soon to the public.

SUES NEW DEPARTURE

Hartford, Conn., March 6—Special telegram—A suit for $2,000,000 damages and an injunction against the New Departure Mfg. Co. has been brought in the superior court here by Albert R. Rockwell, who was deposed from the presidency of the corporation Oct. 19, 1915. Mr. Rockwell asks for an accounting regarding his inventions and discoveries used by the corporation and wants the corporation restrained from using any of his inventions, discoveries and processes in its future manufacturing activities.

NEW OHIO ELECTRIC MODEL

New York, March 6—The Ohio Electric Car Co. has brought out and is showing at the Boston show a new model 44 built on the same chassis as the model 63, but with a different type of body and single control. This model sells for $3,280.

DIES IN ACCIDENT

Indianapolis, Ind., March 5—H. D. Hutcheson, Chicago, district sales manager for the Lexington-Howard Automobile Co., Connersville, Ind., with headquarters in this city, was killed last Wednesday when a motor car in which he was riding turned turtle on the Jackson highway 6 miles west of Lafayette, Ind.

THE WOMAN BEHIND THE MAKER

DOES HER BIT IN MAKING MOTOR CARS PLENTIFUL IN THE LAND

From the Woman's Viewpoint

THE potentiality of the woman today in the motoring field is manifested in no one way but in several. Even in war-torn Europe her potentiality in this respect is manifold. As driver, as repairer, her work is able to make its own fame and to make her as useful as is her sister in the munitions factory, turning out the means of killing other thousands of Europe's fighting men. And the scant reports that trickle through from what is left of the motor industry in the ravaged country hint of the woman in the few car or truck factories that remain.

But to the American is given that fullness of opportunity denied to those of other countries. Not yet has she been forced to turn her energies and abilities to the war plant, though already she is preparing to take her place at the wheel or in the repair shop of the motor car in case threatened trouble descends. However, she has before now had the opportunity to broaden her place in the motoring field, and this opportunity came from the maker of the motor car.

Last summer skilled labor became exceedingly scarce, as did labor of all kinds. It was then that many women had their first chance to enter the motor car factory. They were employed to take the place of men laborers, and in many respects their employment resembles that of the woman in the munitions plants of, say, Great Britain, for instance.

The Chalmers Motor Co. has given several tasks heretofore assigned to men employes exclusively to women. The women do more than merely earn men's wages, too. The heads of the various departments in which they work report that the new departure has proved of satisfaction. The women are more painstaking and efficient in every way in those types of manufacture for which they are employed.

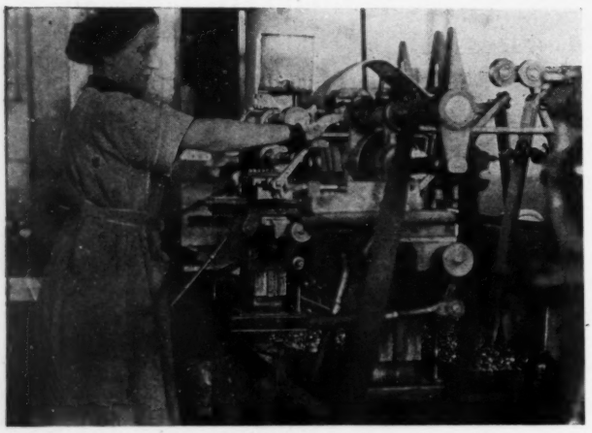
The woman motor car worker is very attentive to detail and can handle small parts successfully

Most of the women who came to the Chalmers plant last summer when skilled labor was so scarce are still with the company. They consider the work in the motor car plant better than that in a department store or household and say that it is more pleasant and attractive. The hours are good, wages are high, and the surroundings are agreeable.

Sewed and Cut First

The woman motor car worker was employed first in the top department. Here she did much the same work that many of her sisters have long been accustomed to doing in factories of different nature. She cut and sewed. This was to prepare the materials for the tops and side curtains.

From the top department the use of women workers spread to more technical departments. And the same result was reported, increased efficiency and greater output.



From the top department the women went to other departments requiring work of a more technical nature. They are experts in the use of the micrometer and detect any defects in the parts that they inspect

At the Chalmers factory the women do all assembly of the wiring systems for motor cars. They also assemble the primer systems and switches. As inspectors they look over the pistons and other small parts and drill press work. To do this they become skilled in the use of the micrometer and thus are able to detect the slightest error in a piece of work.

Like the other motor car makers, the Chalmers company provides a rest room with lounges, arm chairs, magazines and so on for the girls and women in its em-

ployment. All car makers, however, do not carry the employment of women workers to such an extent, though those who have tried the plan report satisfaction with their experiment.

Feminine Motor Notes

The Thomasville, Ga., Auxiliary, the first organized in the state, has planned a civic gateway as an entrance to Dixie highway in that town. Chief among those interested is Mrs. Z. I. Fitzpatrick, formerly president of the Georgia Federation of Women's clubs and now president of the Thomasville Woman's Club. Mrs. Fitzpatrick and her associates have asked the aid of the Coast Line railroad, farmers and their wives in planting trees and flowers along the highway. Thomasville is known as a city of roses, and it is the women's desire to make Thomas county a county of roses through this work which they have undertaken.

Mrs. W. S. Jennings, Jacksonville, Fla., made a trip through the state recently and found that 10 miles of eucalyptus trees have been planted along the Dixie highway in that section. Trees for 10 additional miles are ready for planting. The trees that have been planted are being cared for by the county commissioners and those who live along the road. Mrs. Jennings is interested as president of the Florida Federation of Women's Clubs.

The St. Lucie County Federation is doing a good deal of planting in Florida also. Mrs. Edgar Lewis is president, and she and Mrs. Abdill, both of Fort Pierce, have about 25,000 red hibiscus cuttings ready in their yards. The color scheme is to be red, white and blue with red hibiscus, Jacaranda trees and white oleanders. The federation will be responsible for 25 miles of the highway.

When the brick highway in Vermilion county, Illinois, was dedicated three women had parts in the ceremonies. Miss Hazel Leigh of Chicago was "Miss Dixie" and Mrs. Rudolph Blecher impersonated "Miss Chicago." Miss Elizabeth Bell of Danville impersonated "Miss Danville" and christened the road. This stretch is now part of the Dixie highway.

Mary Anderson, moving picture actress, drives a Scripps-Booth. And, not to change the subject at all, she wears overalls. However, she wears 'em so that she can do her own fussing around the car. She thinks this the best garb for the purpose.

More women drive motor cars in Southern California than any place in the world, according to the estimates of Los Angeles dealers. The women there are accredited with more than 16,000 of the 79,000 cars registered in Los Angeles county. The good roads—there are 14,000 miles of such—and a climate that permits the use of pleasure cars every day in the year are given as explanation.

But Maxwell's monthly magazine caps the comments on women and the car. Marguerite Mooers Marshall, writing for the New York Evening World said, "Men make automobiles; men sell automobiles; men even buy automobiles; but women use automobiles" and Maxwell came back and said "If you don't believe it, read the sentence. Marguerite has used 'automobile' four times."

At the Motor School

MOTOR schools are not for young women, that is, they are not supposed to be. But notwithstanding and nevertheless, it sometimes happens that the young woman is accepted in some unexpected phase of the motor industry.

A young woman claims that distinction in Kansas City, and nobody disputes her right to do so because she is a student at a motor school and expects to make practical use of her motor schooling later on.

When Miss Edna Boyd first went to the Kansas City Automobile School she was not a student. Oh, my, no! They thought she was interested because her brother liked cars or something of that kind. But they think different now.

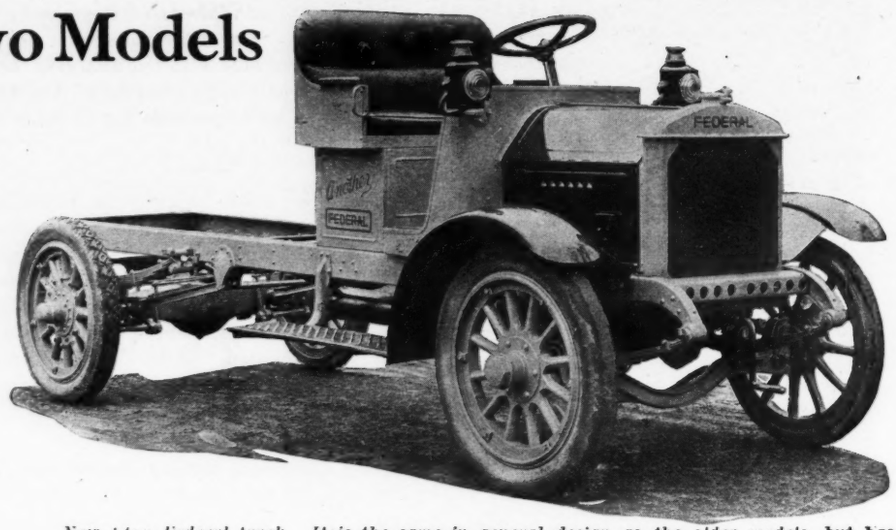
The instructors in the school do not get their hands all chalky, perhaps, but oily they do become, and naturally it was not expected that a young woman would want to go and do likewise. But Cliff Hogan, president of this school, drove the first motor car in Kansas City, and perhaps this is the reason he admitted the first young woman to his school.

Miss Boyd is a stenographer for the Brunswick-Balke-Collender Co. by day and an ardent seeker after facts pertaining to engines, carbureters and kindred things by evening. Later on she expects to become a demonstrator for a sales company in Kansas City, Kan.

The women first entered the Chalmers factory through the top department. There they cut and sewed the materials for the tops and side curtains

Federal Adds Two Models

New 1- and 5-Ton Sizes Make Five Capacities



New 1-ton Federal truck. It is the same in general design as the older models, but has three instead of four speeds

EXTENSION of the range of sizes of vehicles offered by the Federal Motor Truck Co. has been made by the addition of a 1-ton model and a 5-ton capacity. This gives five different sizes, the older ones being 1½, 2 and 3½ tons in capacity. The two new ones are the same in general design as the older Federal models, the latter having been somewhat refined and re-designed in many particulars, so that the line as a whole involves considerable improvement over last year's program.

New Engine Design

Among the new features which characterize the Federal trucks, as just announced, is a new engine designed wholly for truck use, one of the indications of which is the fact that it has a five bearing crankshaft. Another engine feature is that the cylinder heads are cast separately, so that each head may be opened up individually, though the cylinders are in a single block casting.

Body allowances for these models are, respectively, 900, 1050, 1200, 1600 and 1800 lbs. The wheelbases are 132 in. on the 1-ton; 144 in. on the 1½-ton, and on the 2-ton there are four lengths: 120, 144, 156, and 168 in. The 3½ and 5-ton trucks are made up in two lengths, each of 156 and 180 in. Another point at which the different trucks vary is in the treads and loading spaces. The front treads run from 56 in. in the 1-ton unit to 69¼ in. in the 5-ton, and the rear treads from 58 in. in the 1-ton to 70½ in the 5-ton.

The prices of the five models are: 1-ton, $1,650; 1½-ton, $2,100; 2-ton, $2,300; 3½-ton, $3,000; 5-ton, $4,000.

The five different load capacities utilize three different engine sizes. The 1-ton has a 3½ by 5⅛ engine of 25 hp.; the 1½ and 2-ton have a 3¾ by 5⅛, 30 hp. unit; and the two larger capacities have an engine 4½ by 5½, rated at 40 hp. With the exception of the timing gear arrangements, the engines are similar in design. All except the smallest model are equipped with governors.

Engines are four-cylinder, L-head block designs. The pistons are fitted with five Burd high-compression rings, four being at the top of the piston and one at the bottom. In manufacture, the pistons are assembled with the rods and weighed and must check within ¼ oz. The piston pins are of seamless steel tubing, case-hardened and ground. The pin is held stationary in the piston bosses and has its bearing in a Non-Gran bronze bushing secured in the connecting rod. The wrist pin bearing is lubricated by pressure as will be noted.

Main bearings are lined with Fahrig metal held in place by steel dowels. Adjustment is taken up by laminated shims, and the end thrust on the crankshaft is taken by flanges on each side of the rear main bearings. The crankshaft itself is made of chrome-nickel steel, drop-forged, heat-treated and machined all over. Solid forgings of tungsten steel are used for the valves, with inlet and exhaust of the same sizes. The valves are 1¾ in. in diameter. Removable valve stem guides are employed to allow for replacement in case of wear. The tappets are mushroom type ground to size and can be removed from the tappet bushings by loosening the fork crab which holds them in place. This mechanism is entirely inclosed by a plate which keeps out the dirt.

Gear Pump Circulates Oil

High pressure force feed lubrication is used throughout the engine. The oil is circulated by a gear pump located in the gearcase. The oil enters the pump through a strainer and is forced to a main lead, which supplies all the camshaft and main bearings through ducts which are integral with the upper case. At normal running speeds of 1200 r.p.m. the oil pressure runs as high as 50 lb. to the sq. in., so that the oil exercises a cooling effect on the bearings as well as lubricating them. Cooling is by pump circulation and ignition by a single high-tension magneto. One of the features of the engine is that the intake port passes through the cylinder casting, allowing for a preheating of the fuel mixture to take care of the low grades.

Another feature which has to do with accessibility is the placing of a large cover plate on the left side of the crankcase, through which the rods can be disconnected so that the piston and rod assemblies can be pulled up through the remov-

View of 5-ton Federal truck. This model has steel wheels with hollow spokes and felloe, differing here from regulation Federal wheels

able cylinder head. The governors used on the four larger models are centrifugal type throttle valves.

A Borg & Beck single dry-plate design of clutch is used with asbestos fabric-friction rings completely inclosed in a standard bell housing and bolted to the crankcase. The clutch housing also carries the control pedals and levers. It has been made extremely accessible, so that by removing the cover plate the clutch can be worked on. In making repairs on the clutch, it is only necessary to disconnect the universals and remove the cover plate, whereupon all the necessary parts are exposed. There are two universals between the clutch and the amidship gearbox and two universals between the gearbox and the rear axle, giving four universals in the drive between the engine and the Timken-Detroit worm-drive rear axle. The gearbox is of Federal design and manufacture, with all the shafts carried upon annular balls, except the front end of the main shaft, which is carried on a roller bearing. The 1-ton has three speeds, and all the others have four speeds. The shaft for the sliding gear has six splines.

Shafts Are Tubular

Both the front and rear propeller shafts are tubular, and the universals are the cross pin design. The rear axles are Timken-Detroit worm-drive. The drive is taken through radius rods, having ball joints at the rear ends. The springs are shackled at both ends and supported by rods which go across the frame. Oil lubrication is used on all shackles and on the clevises of the steel cross rod. The steering gear is an irreversible worm-and-worm wheel. The radiator has a detachable vertical tube core with tank and sides of Parker rust-proof pressed steel.

Wheel equipment is artillery type of wood for all except the 5-ton, which has steel wheels with hollow spokes and felloe. The seat is all steel with a fully upholstered back, and in the 3½ and 5-ton models it has divided cushions to accommodate three persons. The dash and toe boards are of pressed steel, as are also the fenders, which are a Crown type with apron. Pressed steel also is used for the running boards and hangers. The running boards are filled with hard wood.

Tractor models are furnished on the 1½ and 3½-ton models. These are mounted on a short wheelbase and are equipped with turntable or Rocking fifth wheel, made with a special bracket for the Federal trucks. A neat form of draw bar has been mounted on the rear of these and is illustrated in the accompanying drawing.

TO MAKE ONEIDA TRUCK

Chicago, March 2—The Oneida Motor Truck Co. has been organized in Green Bay, Wis., with $300,000 capital to make a new truck called Oneida in 1, 1½, 2 and 3½-ton sizes. The concern is backed by local business men and contemplates eventually a large production. Factory facilities already have been provided. L. P. Fortin, formerly sales and advertising manager for the Menominee truck, is director of sales and advertising, and G. A. Lindstrom, formerly superintendent of Menominee, is factory superintendent. Lindstrom's pneumatic radiator shock absorber will be incorporated in the new truck.

STARR LEAVES COAST OVERLAND

Los Angeles, Cal., March 3—L. V. Starr, manager of the Overland branch here, has resigned after six years connection with the company. O. B. Henderson has been named as acting manager. Starr joins J. W. Leavitt & Co., former Overland distributors in California, whose interests were purchased by the Willys-Overland Co. for $1,000,000, as vice-president and one of the directors. The J. W. Leavitt company intends to become one of the largest concerns on the coast. Controlling interest has been acquired in J. W. Baldwin Co., this city, distributor of Mitchell and Saxon, and the Du Broy Motor Co., Northern California distributor of the same lines. In addition, Ryus Motor Co., distributor of Chevrolet in Southern California, has been bought out entirely. Distribution of Premier in Northern California also has been acquired. Leavitt and company have been announced as California distributors for Harroun and Columbia cars.

STUDEBAKER INCREASES PRICE

Detroit, March 6—The Studebaker Corp. has increased its price $55 on the four-cylinder roadsters, $80 on the six-cylinder roadsters and $70 on six-cylinder touring cars, the increase being effective at once.

COMPLETE HARROUN PERSONNEL

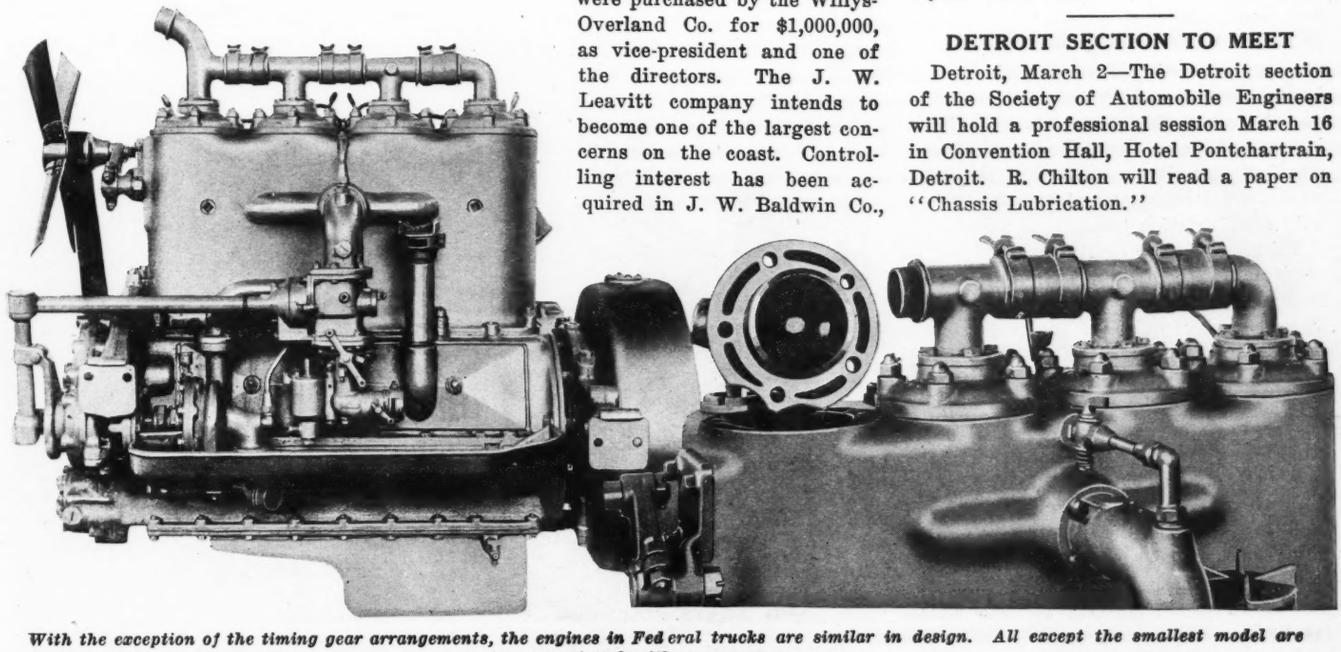
Detroit, March 2—The Harroun Motors Corp. has completed its production department and has appointed B. L. Whitted superintendent of operation, C. E. Hoyt superintendent of machining, N. W. Eagles superintendent of the body department, E. J. Menke superintendent of assembly, C. F. Judisch superintendent of inspection, C. F. de Age chief tool designer, N. A. Nelson foreman of the tool room, J. F. Collins factory office manager. Many of these men were formerly associated with H. O. Bernhardt, factory manager, when he was factory manager for the Pierce-Arrow company.

WASHINGTON OFF HIGHWAY

Chicago, March 2—Washington, D. C., is no longer on the Pike's Peak Ocean-to-Ocean highway. The association has voted to abandon the routing east of Columbus, Ohio, and adopt the line of the William Penn highway that goes through Pittsburgh, across Pennsylvania and New Jersey to New York.

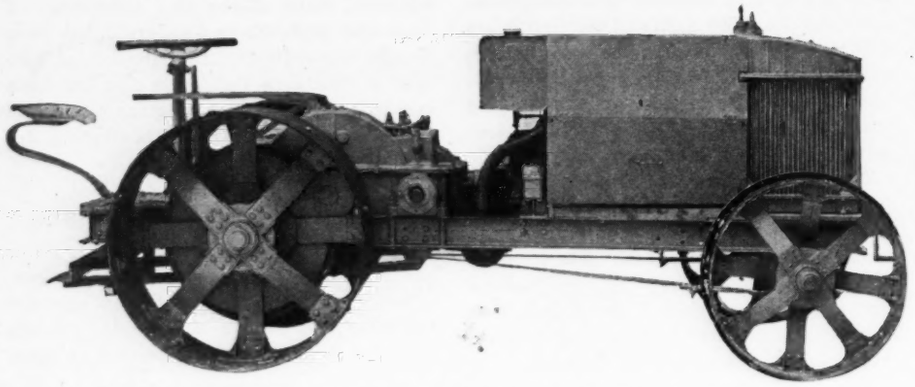
DETROIT SECTION TO MEET

Detroit, March 2—The Detroit section of the Society of Automobile Engineers will hold a professional session March 16 in Convention Hall, Hotel Pontchartrain, Detroit. R. Chilton will read a paper on "Chassis Lubrication."



With the exception of the timing gear arrangements, the engines in Federal trucks are similar in design. All except the smallest model are equipped with governors

Car Features on Tractors



The Wolverine looks very much like a motor car. The control from driver's seat is similar

Wolverine and Four Wheel New Types Embody Passenger Vehicle Points

REALIZING that tried features of motor car design are, in a great many cases, applicable to tractor construction, the Wolverine Car & Tractor Co., Detroit, has brought out a machine which not only follows conventional car design to a great extent but looks more like a motor car than any of the present tractors on the market. The layout of the engine, transmission members and rear axle, the steering wheel and post, the complete inclosure of all working parts in dust-tight housings, running in an oil bath, all follow motor car practice.

Power within the gearset is delivered through a bevel gear meshing with a ring gear on which is mounted a sliding pinion. The pinion engages with two reduction gears, furnishing a total reduction of 52 to 1 and 90 to 1. These gears are mounted on a countershaft with pinions at both ends which mesh with bull gears locked to the drive axle.

Has No Differential

The tractor has no differential. Therefore, maximum pulling power is delivered to both wheels at all times except when turning, and even with maximum turn it is said that the power loss is less than 1 hp. A factor which diminishes the power loss and more or less discounts the argument of excessive wear is that the drive wheels are steel shod and permit slippage with small friction loss.

Thirteen Hyatt bearings are used in the tractor, the transmission units being heavy-duty bearing suspended throughout. The general oversize of the transmission units coupled with the roller bearing suspension and the fact that everything runs in oil bring a claim that there is only 15 per cent power loss instead of 50 as is sometimes the case. Thus with the engine turning over at 1200 r.p.m., developing 27 bhp., it is claimed that more than 20 hp. is delivered at the drawbar, or enough to pull four 14-in. plows in any soil.

The rear wheels have a 42-in. diameter and an 18-in. face, giving an area which results in a unit pressure of 4⅔ lb. to the square inch in soft ground.

The engine is a heavy duty four-cylinder Continental with a bore and stroke of 3¾ by 5. It is the conventional Continental tractor type with L-head cylinders and the intake manifold cast integral. The engine burns kerosene, which is fed through an Ensign carbureter. This is one of the latest and most satisfactory types of kerosene carbureter. There is a water injector that moistens the fuel above a certain throttle opening, and this feature is said to greatly assist combustion and reduce carbon formation.

Another feature taken from the motor car is the thermostatic control of the cooling water temperature. The thermostat is designed to keep the wall of the combustion chamber at 212 deg. Fahr. under all conditions. This is the accepted temperature at which kerosene will show high thermal efficiency.

The clutch is of the expanding-shoe type which can be set to stay in or out of engagement. A toggle joint arrangement in the clutch release mechanism makes this possible.

Many provisions are made to keep dust out of working parts. The valve cover plates are carefully machined for a sealed fit, the Eisemann magneto is water and dustproof, the crankcase breather has a check valve that allows pressure to escape but no air to enter. The carbureter is fitted with a dust separator of the centrifugal type, which really washes the air.

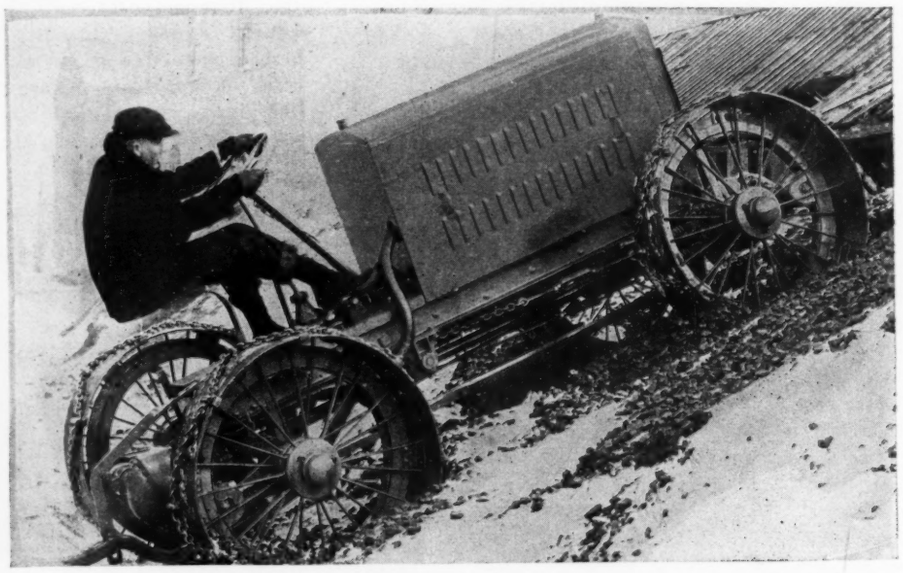
The driver sits in the tractor as he would in a motor car. The steering wheel, spark and throttle controls and gear change lever are similarly located. The seat is so located that every part of the machine is under surveillance and at the same time the driver may watch his plows.

The Four Wheel

FOUR 32-in. wheels with 12-in. faces are used to drive the 25 drawbar hp. tractor built by the Four Wheel Tractor Co., Clintonville, Wis. That this rather small unit is capable of extraordinary pull has been demonstrated by recent tests at the factory. One of the stock tractors pulled a box car in which every brake had been set as tight as a strong man could turn it. Another test was to haul 20 tons of lumber on two sleighs on an ice road and up a fair grade.

Despite the fact that the tractor is capable of heavy pulling for its power, it

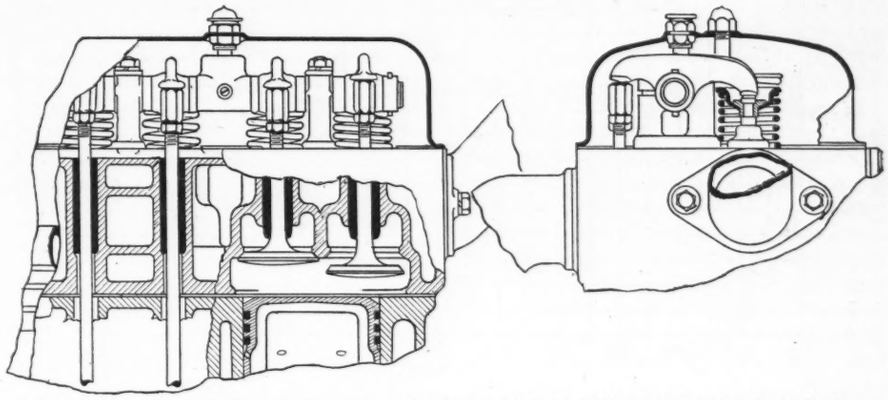
(Continued on page 44)



In a recent test of the Four Wheel tractor at the factory a stock model pulled 20 tons of lumber on two sleighs on an ice road up a fair grade

Overhead-Valve Four Weidely

New Model Is Designed to Develop 50 hp. at 2400 r.p.m.



The entire valve mechanism, outside of the cams and pushrods, is carried in the cylinder head casting. Note the water space around the valves

THE entire overhead valve mechanism is carried in the head in the new Weidely four engine, which is made by the Weidely Motors Co., Indianapolis, Ind. The cylinders are block-cast with a 3½-in. bore and 5½-in. stroke, developing 50 hp. at 2400 r.p.m., according to the horsepower curves.

Valves have their mounting directly over the combustion chamber and are actuated through rocker arms and then push rods which are moved by the main cams in the crankcase. These necessarily long push-rods are guided through a large part of their length. The valve mechanism is inclosed with a cover plate. The combustion chamber is carried entirely in the detachable cylinder head, so that the piston only rises to the top of the main cylinder casting.

Iron Pistons Are Used

The main cylinder casting is integral with the top half of the crankcase. To this is attached a pressed-steel oil pan provided with an oil reservoir and splash troughs into which the scoops on the connecting rods dip for splash lubrication.

Iron pistons are used, having a 4¾-in. skirt, fitted with three rings each, all above the wrist pin. The weight of the piston complete with rings and wrist pin is 2 lb. 6 oz. The connecting rods have an 11-in. length. Their weight is 4 lb. 9 oz. each. The crankshaft is 2⅛ in. in diameter with 2⅛-in. bearings throughout. The bearing lengths are 2½, 2½ and 4 in. from front to rear.

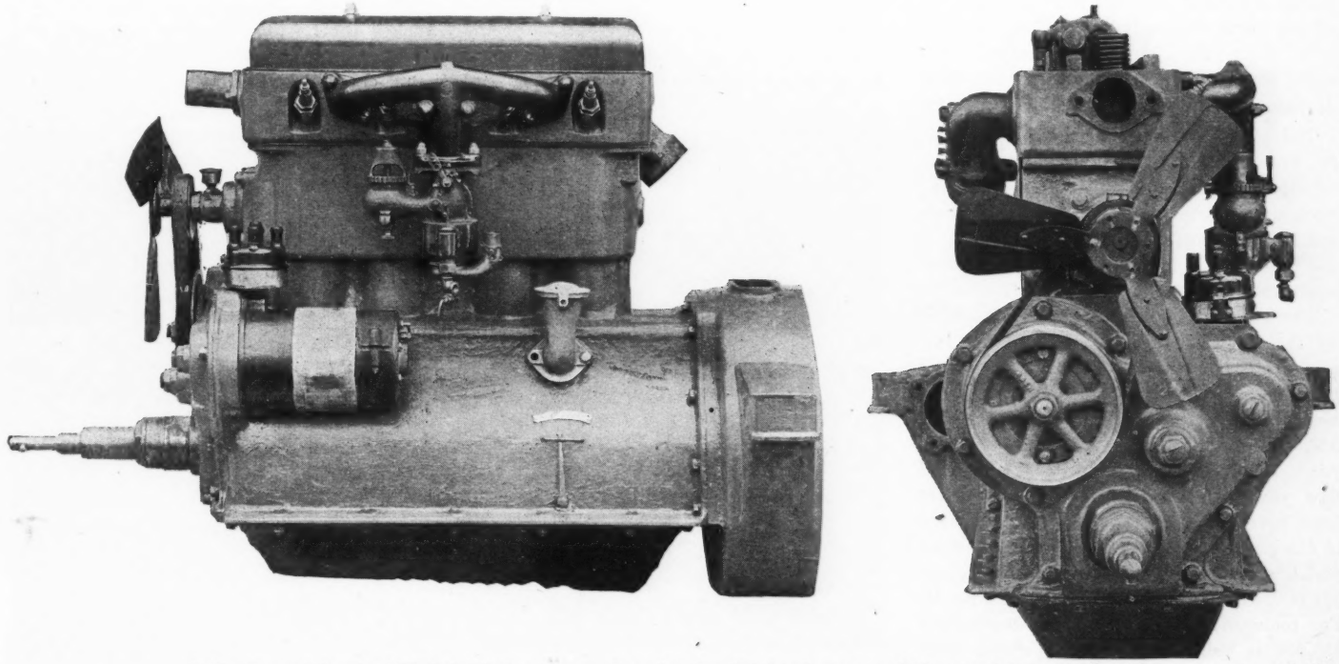
Three main bearings are also used to carry the camshaft. The camshaft has a 1⅛-in. diameter between bearings. The cam followers are flat and bear directly on the cams without intermediate linkage or rockers. Valve springs are of the single spiral type, having a 75-lb. pressure. Timing follows conventional practice, with exhaust opening at 40 deg. before bottom center and closing directly on upper center. The intake opens at 5 deg. past upper center and closes at 50 deg. past lower center. The valves are 1 3/16 in. and have a 5/16-in. lift.

Oiling is pressure with auxiliary splash provided by dippers on the connecting rods. The oil pump is the gear type driven from the rear end of the crankshaft. Oil leads carry directly to the three main bearings and timing gears and from there through drilled holes in the crankshaft to the connecting rod bearings. Splash takes care of all other moving parts.

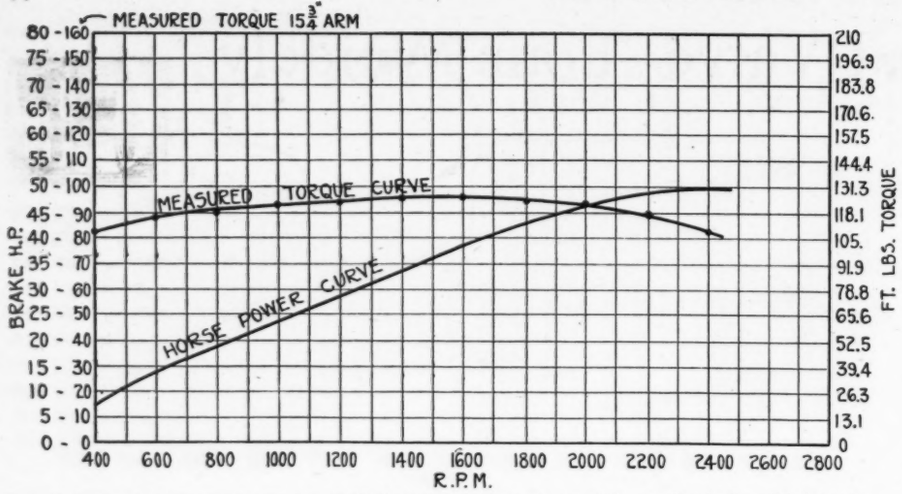
Water Cooling Process

A centrifugal water pump circulates the cooling water. The water intake passage is located at the front end of the cylinder block and the outlet is bolted against a flange on the front end of the cylinder-head casting. The water is carried well up around the valves and over the top of the combustion chamber. The water passages between the cylinder block and the cylinder head are large enough to give a free circulation around the metal of the head. Thus the studs which hold the cylinder head in place are not loosened or misplaced by the heat.

The intake and exhaust manifolds are attached, bolting against the cylinder head casting. The spark plugs are on the intake



Left side and front of Weidely Motors Co. engine, showing the head cover and the generator attachment



The horsepower curves of the Weidely four show it is capable of developing 50 hp. at 2,400 r. p. m.

side and are screwed into recesses in the side of the head.

Standard mountings are provided for generator and starting motor with the generator on the left front side of the crankcase, taking the drive directly from the timing gears. Although regular provision for starter mounting is on the right rear side of the crankcase, the mounting can be made as desired.

At Emerson Factory

(Continued from page 31)

machine shop is used for machining all parts going into the assembly of the car. Wheel hubs were being machined in quantities.

The vertical part of the T in the factory layout is used for general assembly work. It roughly divides itself into three parallel divisions from end to end. At the right is the chassis assembly with room for four parallel assembly tracks. In the center the bodies are fitted and the final assembly of all car parts accomplished. Along the left is a chain for four departments, sheet metal works, final paint and varnish, chassis painting and fitting and finished stock.

The sheet metal department, 72 by 40 ft., at present is fitted with a new fender rolling machine, cutting machine, beading machine and other small parts. Hoods now are being manufactured here and some of the fenders. It is planned to manufacture considerable of the body parts also.

The amount of money already invested by the Emerson company around the factory is considerable. Real estate and buildings cost $136,000, all of which has been paid for, excepting a mortgage of $33,000, which will be paid off at $5,000 a year. The property is free of taxes for five years. Approximately $150,000 has been invested in materials which has been in the process of manufacture for car components. Machinery equipment has taken $28,000, and $32,000 more is going into it. For tools and jigs for engine manufacture $35,000 is being expended, of which $12,500 already has been paid out. The financial statement shows $160,000 cash in the bank. The company has several dealers who have made stock purchases, and some of these have made cash payments of considerable quantities.

The company has contracted for 10,000 sets of parts for car manufacture, and of these deliveries have been specified on 5000.

At present the company reports between forty and fifty dealers who are contracting for cars and placing deposits in the regular selling way. The company estimates that it will manufacture 150 cars in March and exceed 300 in April.

The Four Wheel

(Continued from page 42)

weighs but 6000 lb. complete. Motor car practice is evident in practically every detail of the design. The engine is under a conventional hood, and a slanting steering post and a motor car type of steering wheel are used. The gearshift lever is of the motor car ball type. The engine is a four-cylinder Doman with 5-in. bore and 6-in. stroke giving a rated horsepower of 35, a brake horsepower of 30 at normal operating speed and a drawbar horsepower of 25. The gearset, placed amidships, is of the sliding type and gives three speeds forward for 1¼, 2½ and 5 m.p.h. The clutch is operated by a pedal. The normal operating speed of the engine is 550 r.p.m. It is lubricated by a full splash system from separate compartments in the base. A constant oil level is maintained by a gear pump supplying lubricant from a 3 gal. reservoir. The engine will operate either on kerosene or gasoline or a mixture of the two. It is claimed that these engines when properly regulated will consume only 1/9 gal. of gasoline per horsepower hour.

The tractor is fitted with brakes which are actuated by pedals operating on the drive shaft and affecting all four wheels. The tread is 56 in. with a wheelbase of 90 in., and the car has a very short turning radius.

The layout of the transmission units follows motor car practice in every detail. Drive from the engine passes into the gearbox and thence through universals to bevel gears and a differential in both axles. Drive is conducted from the axles through spur gears onto bull gears on the rims of all four wheels. The axles are of square, hollow steel, and both swing on large pivots in the center. There is a saddle on the front axle which allows the tractor to tilt at any angle of axle when going over rough ground. Hyatt roller bearings are used throughout.

Efficient traction is obtained by chain lugs and sliding spurs that grip the ground and automatically clean themselves and the wheel. The chains are easily removed, leaving a smooth wheel for light work, such as seeding, cultivating and rolling the soil, running on hard roads, etc. Because the light weight of this tractor is distributed equally on all four wheels, it does not pack the soil. All parts are of steel, which makes the running chassis very light and the principal weight is carried in the engine, gearbox and frame.

This shows the Four Wheel Tractor Co. machine tackling the snowdrifts of a grade

The Accessory Corner

Foot Air Accelerator

THE Foot Air Accelerator inserts hot air air in correct proportions into the intakemanifold, increasing the efficiency of the carbureter 100 per cent, it is claimed. Its makers guarantee the device to give satisfaction and say it will increase the gasoline mileage 75 or 100 per cent. Price, $6. Foot Air Accelerator Co., Cincinnati, Ohio.

Lock Cuts Off Gasoline Supply

The Benefield combination lock works on the dial plan. It can be installed in an hour on a car of any make and operates by cutting off the gasoline supply between the carbureter and the manifold couplings. The dial is on the dash, and steel rods connect it with the lock. Tumblers in the lock make it impossible to open the valve by cutting the rods or removing the dash dial. The combination can be changed in 2 min., it is said. Price, $10. Security Automobile Lock Co., Indianapolis, Ind.

Way Auto-Camp Outfits

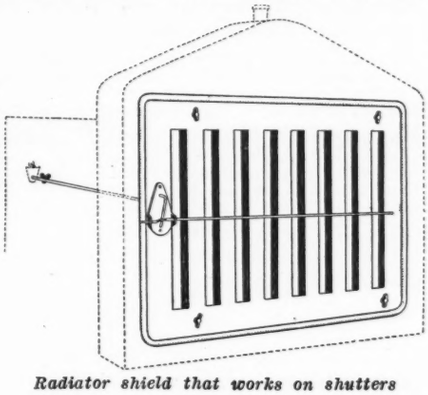
The Way Auto-Camp includes springs, cotton mattress, a 7 by 9 waterproof tent with folding tent poles, ropes and stakes, all fittings necessary to fasten the outfit to the car and a waterproof case to cover and protect the outfit when packed and traveling. The outfit is attached to the running board or rear of car and weighs 80 lb. The whole outfit folds into a compact, square package over which the waterproof case fits snugly, protecting everything from mud, dust and rain. To set up camp the cover is removed, the bed, hinged at the middle, is let down, the tent, poles and stakes, folded up with the mattress, are removed, and you are ready to make camp. Price, $48. A special outfit with a tent 9 ft. 4 in. square and two cots and springs is furnished for $60. Way Sagless Spring Co., Minneapolis, Minn.

It Locks Without a Key

The Masterlock acts as a combination lock for the motor car. The combination consists of four buttons which alone, among ten evident buttons, give the desired operation of the car. The lock is a permutation switch operating on the electric current and is set in the dash or in any other convenient place. It appears as an etched metal plate, 2⅜ by 4⅝ in., in which are ten push buttons. No electrical circuit can be established from the battery or magneto to the spark plugs except when the combination of push buttons is in operation. The device can be opened for changing the combination only by returning it to a service station or the makers. It requires from 1 to 2 hrs. for installation, as wire connections must be made. The Mastertool Co., Chicago.

Safety Steering Device for Ford

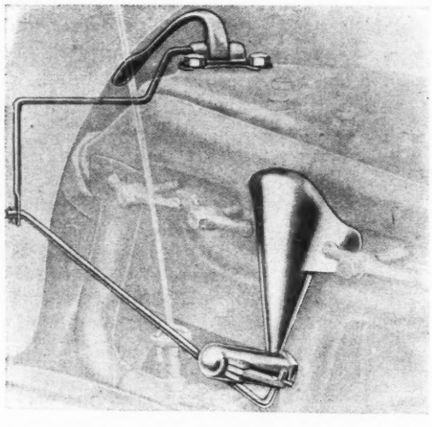
The Over-Land Guide supports the tie rod in the center, eliminates rattle and keeps the wheels in perfect alignment, preventing buckling, breaking of steering-parts or tire blow-outs, it is claimed. The device weighs 3 lb., consists of safety-stops, spring and tie rod clamp and can be installed in 5 min. with a small wrench. It contains two bearings, both of which are adjustable. The spring is oil-hardened, 5¾ in. long and compresses only ⅛ in. when making a turn. It is packed in hard grease and inclosed completely, thus keeping free from dust and moisture. Price, $3.75. Meixell Co., Indianapolis, Ind.



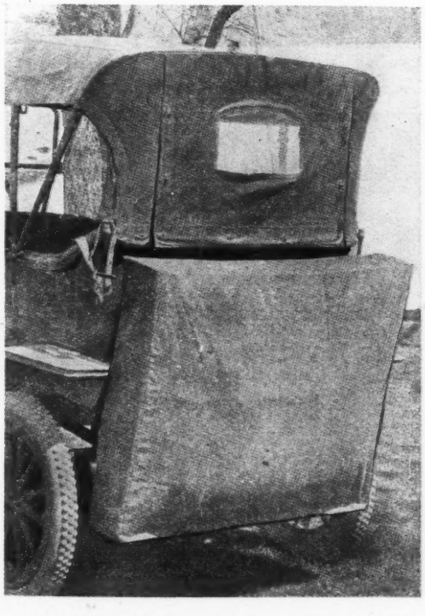
Radiator shield that works on shutters

Metal Radiator Shield

The H-M radiator shield is designed to equalize the engine temperature in all kinds of weather. The device weighs less than 2 lb. and is made of sheet metal swedged so it lies over the swedged edge of radiator. The shutter arrangement of moving panels is operated from the dash. The device can be attached to any type radiator in a few minutes. A small hole in the dash near the floor board provides for the quadrant and shift lever which operate the shield. Three phases of heat control are provided, varying with the position of the shutters, completely open, half open and completely closed. H-M Metal Radiator Shield Co., Indianapolis, Ind.

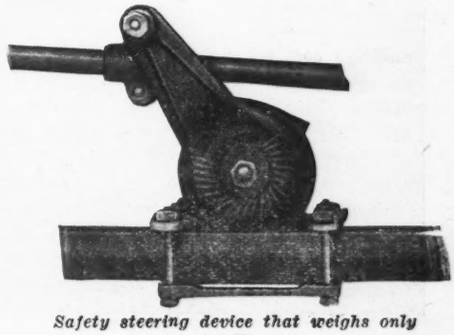


Device to increase carbureter efficiency



One way to carry tent and fittings

Benefield locking outfit complete, as it comes to purchaser



Safety steering device that weighs only 3 lbs.

The Readers' Clearing House

FORD HULA-HULA FROM HONOLULU

Hawaiian Motorist Rebuilds Car Bought at Sheriff's Sale

HONOLULU, Hawaii—Editor MOTOR AGE—In reply to your request for photographs and description of rebuilt Ford cars, I give you a view of my home-made speedster. See Fig. 1.

The cost of this car is in the neighborhood of $550, not including my time. I bought the chassis at a sheriff's sale, it having served its time as a jitney for a year or so. It is a 1910 model. I overhauled it thoroughly from stem to stern, dropped the frame 4 in. by undeslinging the front spring and by removing two leaves from the rear and flattening the spring. I put on four Hartford shock absorbers and geared it to 3 to 1 with gears from the Detroit Gear Co.

Following is the approximate cost:

Chassis	$ 90.00
Overhauling and new parts	30.00
New gears	12.00
Wire wheels	35.00
Bosch magneto	60.00
Master carbureter	20.00
Radiator and body	150.00
Hartford shock absorbers	20.00
Kelly-Springfield tires (4)	90.00
Aluminum-alloy pistons	24.00
Total	$531.00

The motor is fitted with a Bosch magneto and a Master carbureter. It is fitted with aluminum-alloy pistons made by the Butler Mfg. Co. of Indianapolis, and light connecting rods.

The radiator is special from the Champion Radiator Co., Chicago, and the body is from the Auto Remodelling Co. of Chicago. It includes two bucket seats, a gasoline tank of 15-gal. capacity, an oil tank of 4-gal. capacity and a tool compartment in the rear.

—Henry P. Beckley, 743 Twelfth avenue.

DATA CONCERNING HARROUN CAR

Car Speed, Acceleration and R.P.M. as Stated by Maker

Bellflower, Ill.—Editor MOTOR AGE—What is the maximum speed of the Harroun motor on the road?

2—Is it posible to get 2800 r.p.m. out of the motor on the road?

4—What is the best acceleration a person could expect from a Harroun car on the road?—

3—What is the maximum speed of the Harroun with five passengers on good dirt roads? Clarence Rohlfing.

The Harroun company states:

1—A maximum speed of 60 m.p.h. has been attained on the road.

2—Better than 2800 r.p.m. on the road.

3—Fifty-four m.p.h. have been made over snow-covered roads around the city of Detroit with a driver and two passengers. It is safe to assume that this could be done easily with a driver and four passengers, without any snow on the ground.

4—The Harroun car by test, has shown an acceleration from 10 to 30 m.p.h. in 10⅕ sec. This test was conducted by Mr. Harroun on the Sheepshead Bay track under adverse conditions last December, when the track was partly covered with ice.

Hudson 33 as Cloverleaf

Dallas, Tex.—Editor MOTOR AGE—Kindly publish a sketch of a Hudson 33, converted into a speedster. If possible, I would like to have the seats in cloverleaf effect, so as to seat three persons, and would like to leave the hood and cowl in the same position, except for minor changes.—A. Green.

This is illustrated in Fig. 2.

Suggests Raising Cylinders

Evansville, Ind.—Editor MOTOR AGE—In reply to Leland Short, Lake City, Ia., in the Feb 8. issue of MOTOR AGE I would advise that the use of a Bosch DU 4 high-tension magneto would give better results than the one which was on the car. The carbureter that is on this car when new does not handle the present grade of gasoline as it should, and I believe he would feel amply repaid in every way by making the change he spoke of in both cases. Another thing that will pay is to have his cylinders raised ⅛-in. by using that thickness fiber under same. I made these changes in my 79 roadster and am sure it paid me.—A. E. Sullivan.

THE USE OF NON-LEAKING RINGS

If Loginess Is Due to Worm Cylinders These May Remedy the Trouble

Washington, D. C.—Editor Motor Age—I have a 1915 Hupmobile, model K which has traveled about 1,000 miles. Would a set of non-leaking piston rings improve its power, speed and getaway? If so, what size, how many and what make should I purchase? The car seems logy at all speeds. What will improve it?—Alvin S. Barnett.

Probably. The number to use depends on the state of the cylinders. Sometimes using a non-leaking ring as the top one only suffices. Usually, however, it is better to use all non-leading. You should have twelve for this engine, 3⅜ by $\frac{3}{16}$ in.

It is impossible to say what will improve the engine to the greatest extent without knowing more definitely the cause of its being "logy." It may be improper timing carburetion or ignition, badly seating valves, worn pistons and cylinders. If the latter the new rings will remedy the trouble, probably.

PRINCIPLE OF OWEN MAGNETIC

Magnetism Provides Clutch and Gearset Functions

Tangent, Ore.—Editor Motor Age—Is it necessary to take a course in a motor car school in order to get into the racing game?

2—Explain operation of the motor used in the Owen-Magnetic.

3—Are there any rewards offered by any company for breaking the transcontinental record, and, if so, what company?

4—Illustrate by diagram the necessary changes to convert a 1911 Hudson 20 into a speedster.—Delmer R. Luper.

1—No.

2—The diagram, Fig. 4, shows the principle of the Owen Magnetic.

3—No.

4—Illustrated in Fig. 3.

REVERSING THE OWEN MAGNETIC

Changing Direction of Drive Is Mechanical—Is Four Fastest Car?

Beloit, Kan.—How is reverse accomplished on the Owen Magnetic?

2—How is reverse accomplished on an electric car?

3—Is it not a fact that more speed can be obtained from a four-cylinder engine than any other type of multiple-cylinder motor.

4—How can one become eligible as a A. A. A. race driver?

5—What concerns balance crankshafts—George A. Young.

1—By means of a short lever which oper-

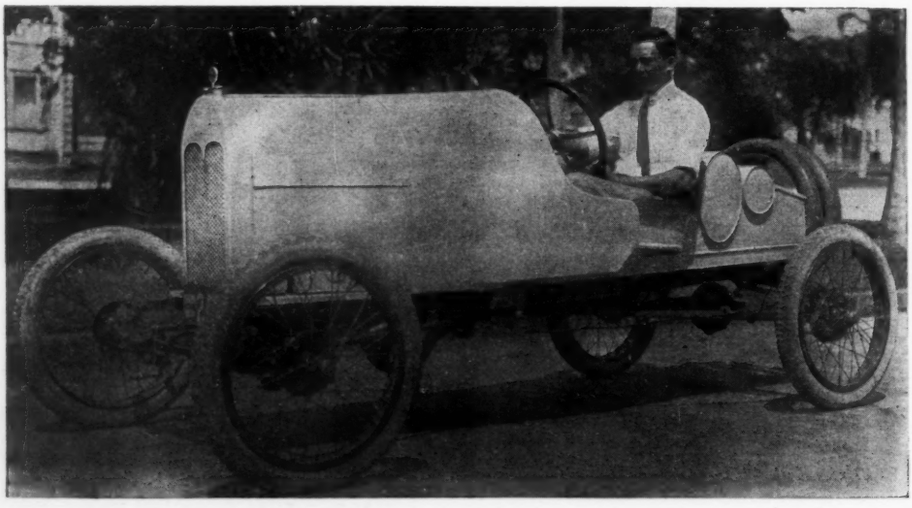


Fig. 1—Hawaiian's Rebuilt Ford

ates a set gear. This is placed in one position for forward travel and in another for reverse.

2—By reversing the armature current in the motor by a four-point switch.

3—This is not proven. The world's fastest car and incidentally, the largest racing car, the monster Fiat, is a four.

PRINCIPLE OF OWEN MAGNETIC

Elementary Explanation of Use of Magnetic Attraction for Variable Speed

Gainesville, Tex.—Editor MOTOR AGE—Explain the Owen-Magnetic drive.—A Reader.

The principle of operation of the Owen Magnetic drive is developed in Fig. 4, 5 and 6 as follows:

Fig. 4—A—Magnet with keeper familiar to everyone.

B—Magnet on pedestal with hand crank to revolve it.

C—Piece of steel on pedestal placed within magnet on same line of travel. It will be apparent that as the magnet is revolved by turning the crank it will attract the piece of steel which will revolve with it.

Fig. 5—B is now revolved by gasoline engine instead of hand crank, taking the place of the flywheel and revolves at engine speed regulated by the throttle, and to accurately describe it, we will call B a revolving field. C is now part of propeller shaft, and to accurately describe this we will now call C an armature, and when car is running in high speed, C follows B, because it is magnetically locked, but it will be noted that we are driving through an air space or gap, there being no mechanical connection at any time between the rear axle and the gas engine, only magnetism transmitting the torque of the gas engine to the rear axle. When arriving at a grade which is too steep to climb on high, we would not stall our gas engine unless we applied a form of speed reduction.

Fig. 6—The conventional electric motor D, as shown in illustration 6, gives us the reductions needed in the following manner: We now drive through what is in effect a slipping clutch in the old type gear transmission car, all the power of the engine would be transmitted to the rear wheels and there would be no use for a gearbox. The magnetic transmission gives us this result, as we now find that C is trying to keep up with B, but as B and C now have ceased to be magnetically locked, because we have changed the position of the control lever on the steering wheel, and are therefore slipping, the difference in their relative speeds generates electricity which is led to D. Armature E, being of the same form as C and on the same propeller shaft, takes the electricity generated by the slip and acts as a power booster on the propeller shaft, giving us innumerable speed reductions, wonderful flexibility and absolute silence at all speeds.

Inquiries Received and Communications Answered

Henry P. Beckley....Honolulu, Hawaii
Clarence Rohlfing.....Bellflower, Ill.
A. Green.....Dallas, Tex.
A. E. Sullivan.....Evansville, Ind.
Alvin S. Barnette....Washington, D. C.
Delmer R. Luper.....Tangent, Ore.
George A. Young.....Beloit, Kan.
A. Reader.....Gainesville, Tex.
S. Sanches Marti.....Havana, Cuba
John W. Sanner.....Decatur, Ill.
A. J. Montagne.....Beaumont, Tex.
A. C. Zimmerman.....Pekin, Ill.
G. J. Rigau.....New Orleans, La.
U. V. Cook.....Voss, Tex.
Grand Junction Tool & Awning Co....Grand Junction, Col.
J. D. Blue, Jr.....Cedar Rapids, Ia.
Harvey Jensen.....Viborg, S. D.
A. Subscriber.....Covington, Ind.
Ray Montgomery.....Synarep, Wash.
B. E. W.....Wichita Falls, Tex.

HISPANO-SUIZA ENGINE SPANISH

Cuban Corrects Statements in Aviation Motor Story

Havana, Cuba — Editor MOTOR AGE — In the article on aviation engines in the issue of Feb. 15, it is stated that the Hispano-Suiza engine is of French design and that the Hispano-Suiza firm has been building motor cars in Paris for a dozen years. I know with full certainty that the Hispano-Suiza is a Spanish firm whose main works has been established in Barcelona since 1905. Its branch factory in Paris was opened in 1911 and not twelve years ago.

The original aviation motor was first designed, developed and built at the Barcelona factory more than two years ago. Then the French Government tried it with severe tests and ordered to the French Hispano-Suiza Works to try the production. This was so successful that the allies ordered urgently more than 6000 motors. The Hispano-Suiza factories at Paris and Barcelona are building 2000 of them but, it being impossible to fill the demand within stated time, many other firms take the construction of the H-S motor with his rights. These firms are: Peugeot, Aries, Brasier, Doriot-Flandrin, Voisin and Leflaive in France. The four firsts are well known motor car manufacturers. Also are building the H-S motor at the Royal Aircraft factory in England, the S. C. A. T. at Italy, the Russian War Office at Russia and the Wright Martin Aircraft Corp. in U. S., this being the largest concessionary —1000 engines.—E. Sanches Marti.

PROBABLY NOT CLUTCH TROUBLE

Fault in Rader's Car Probably Due to Intermediate Unit Instead

Decatur, Ill.—Editor MOTOR AGE—How can I stop the clutch grabbing on my 1915 model Maxwell touring car? I recently had the clutch relined, since which time it has persisted in grabbing, notwithstanding I have used neatsfoot oil, flake graphite and ordinary lubricant. When the car was new it did the same thing but finally the conditions became adjusted and the clutch worked beautifully until worn too much for dependable service.

2—How can I know definitely when the timing is just right on this motor?

3—Why do motor car makers persist in stating that certain cars used in tests for speed are stock cars, when they know they have been constructed quite differently from the regular stock product?—John W. Sanner.

1—Since neatsfoot oil, flake graphite and ordinary lubricants have been used without remedying the clutch trouble, it indicates that it is not the fault of the clutch but probably the fault of some other unit between the clutch and rear axle.

The splined connection between the universal joint yoke and the drive shaft may be badly worn and have too much lost motion, or play. Likewise the universal joint yokes and case may be worn badly which would also give too much lost motion. Either condition would make the car act as if the clutch grabbed, because there would be so much play in these parts that with engagement of the clutch, the clutch and other parts would be in motion and turning at quite a speed before the worn parts become engaged and apply power to the drive shaft. As a result, the car would be started forward with a jerk. But the clutch at this time would not be engaged sufficiently to drive the car, and consequently it would slip, allowing the drive shaft, which would then be driven by the rear wheels, to over-run the worn parts. Further engagement of the clutch would again jerk the car, and again the clutch would probably slip. This would continue until the car was under motion and the clutch fully engaged.

Another possible source of trouble is in a badly worn transmission front bearing. This condition in a car would allow the clutch and its shaft to drop slightly out of alignment, which would result in the clutch lining coming in contact with the flywheel at its lowest point only when the clutch is first engaged. It is not difficult

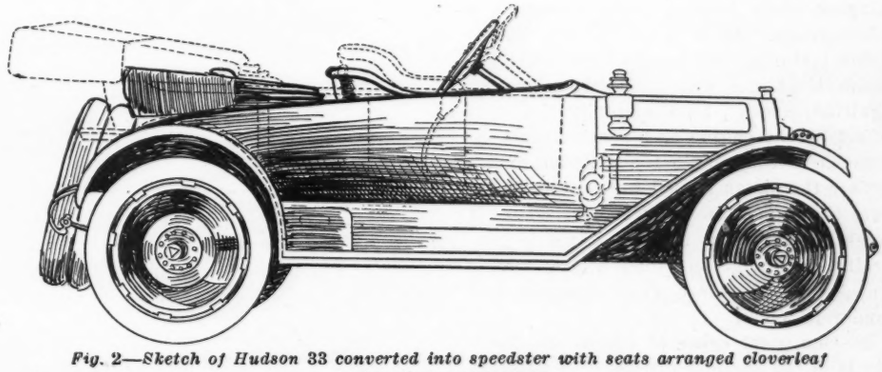


Fig. 2—Sketch of Hudson 33 converted into speedster with seats arranged cloverleaf for three passengers

to understand how this would give the clutch the symptoms of grabbing when first engaged, as the friction between the clutch lining and flywheel under above conditions would not be sufficient to start the car smoothly.

Still another possible source of trouble is in a worn crank shaft rear bearing. With such a bearing in the engine, the flywheel would drop out of alignment and allow the clutch lining to first come in contact with only the highest part of the flywheel. The result would be exactly the same as outlined in preceding paragraph. It is obvious that if the trouble is due to the above parts being worn, proper installation of new parts should remedy the trouble.

2—To tell definitely when the ignition on the 1915 Maxwell engine is timed properly, proceed as follows:

Remove No. 1 spark plug and place No. 1 piston (the front piston) in firing position (top of its stroke). With piston in this position, and spark control lever fully retarded, a slight movement of the piston on its downward stroke should separate the magneto breaker points.

3—Few of them do.

LOCATING KNOCKS BY THE SOUND

Practically Impossible to Differentiate Between Carbon and Spark Knocks

Beaumont, Tex.—Editor MOTOR AGE—Explain the difference in sound and causes of what is commonly known as carbon knock, spark knock, and gas knock. I understand that pre-ignition will cause a ringing knock. Would that apply to carbon and spark knocks?

2—I have an Abbott-Detroit Battleship roadster and have experienced considerable trouble with overheating. I believe that it is in the circulation. Although the water seems to circulate, I imagine the pump does not work as it should. What are the general causes of trouble of this kind, and the remedies?

3—Is there any adjustment that could be made on the timing gears to quiet them?

4—In an effort to make the motor run smoothly and develop more power I have made the following improvements: the cylinders ground and new aluminum pistons fitted, installed Atwater-Kent ignition, Rayfield Model G. carbureter, A. C. Titan plugs, Stewart Vacuum feed, and still the motor does not idle smoothly and seems to fire stronger on two or three of the cylinders. Can MOTOR AGE suggest something, besides grinding the valves, and the proper adjustment of the carbureter?

5—The motor is a Continental 44-50. The gear ratio is 2⅞ to 1. The weight of the car with passengers is 4,200 lbs. Use 35 by 4½ in. tires. What should be the maximum speed of this car under favorable conditions?—A. J. Montagne.

1—A man that can tell the source of engine knocks by the sound is like the man who can call off the names of all the opera singers when hearing their voices on a phonograph. It is a possibility, but it takes training. We hardly know what you mean by a gas knock. Carbon, or pre-ignition, knocks, have virtually the same effect on the engine as a spark knock, inasmuch as they cause the cylinder to fire before the piston is past top center. Therefore the sounds are very nearly alike. It might be said that a spark knock is generally more vigorous than a pre-ignition knock and therefore more metallic and louder in sound.

2—One great cause of engine overheating is in the troubles discussed in question 1. If the cylinders are so full of carbon that they cause pre-ignition or if the spark is set too early the effect will be to cause the engine to overheat. Another cause is excessively high compression, and another trouble may be in the cooling system.

3—Not in this car.

4—Having no means of viewing the operation of the engine we cannot say what the matter is. It may be that the fitting of the new pistons and rings and the grinding of the cylinders was not done properly with the result that the compressions in the cylinders are unequal, which causes a galloping of the engine.

5—It is impossible to give even an approximate estimate. To do so we would have to know the brake horsepower of the altered engine, wind resistance, tractive effort, etc.

WHY ATWATER KENT USES BATTER

Causes for Broken Down Windings—Carburetion

Pekin, Ill.—Editor MOTOR AGE—Why does not the Atwater Kent system, when used on Fords, use the Ford magneto except for starting, instead of using dry cells continuous.?

2—Give any and all causes for broken-down coils, or windings in a high tension coil, or magneto winding and could an electric testing company overhaul it if it had a leaky condenser or a broken winding?

3—Does Maxwell still use dry cell ignition in connection for starting or do they use magnetos only?

4—What is the difference in admitting air between the carbureter and cylinder or by increasing the auxiliary air intake on the carbureter, and why does the former method give such quick acceleration?—A. C. Zimmerman.

1—Because the Atwater Kent system is designed as an improvement over the Ford magneto for ignition at all operating speeds. The claim is that it gives a more even and hotter spark when a hot spark is most needed.

2—The windings may be effected by a short circuit, by continual vibration of the car, by too close location to a hot motor, or by general deterioration from long service. A leaky condenser or broken winding can be repaired in a competent electrical shop.

3—Dry cells are used no longer in the Maxwell.

4—Theoretically the air and gas in the carbureter are compactly mixed into the proper explosive mixture. Any more air would mean too weak a mixture with consequent poor firing. When air is admitted above the carbureter it rushes into the cylinder without suspending itself thoroughly in the gas and gives oxygen to assit the combustion of the already mixed gas.

EFFECT OF USING OVERSIZE TIRES

Better to Change Two at Once—Size and Pressure

New Orleans, La.—Editor MOTOR AGE—If I attach a $20 Klaxon horn to the engine of my car, will the heat of the engine hurt it in any way?

2—My car is now equipped with 34 by 4 tires. Will it hurt the car in any way if, as the tires wear out one by one, I should replace same with 35 by 4½ tires?

3—How much less air pressure than that recommended by manufacturers can be put in the tires of a car using oversize tires?

4—Will the use of oversize tires affect a speedometer which is driven from the universal joint?—G. J. Rigau.

1—Not if there is a good air space around it.

2—It will throw more work on the differential and interfere a little with steering. Change the two rear wheels first, then the two fronts.

3—This depends on the car weight and the make of the tires. Tire calipers will show the proper inflation.

4—Yes.

CALCULATING THE ENGINE POWER

What is Meant By N. A. C. C. Horsepower Rating

Voss, Tex.—Editor MOTOR AGE—What is a horsepower according to the N. A. C. C. rating? I am informed that a horsepower is a power that will raise 33,000 lbs., one foot in one minute. Am I correct? Please explain how this test is made.—U. V. Cook.

Yes, the definition of a horsepower is correct.

The N. A. C. C. horsepower rating means the power rating of the engine as determined by the formula which has been adopted by the National Automobile Chamber of Commerce, which is the national association of manufacturers in the motor industry. The formula formerly was known as the A. L. A. M. formula from the fact that it was first adopted in America by the Association of Licensed Automobile Manufacturers. When this association disbanded, its standards were turned over by the Society of Automotive Engineers, and the horsepower rating formula, by the N. A. C. C.

The formula as usually stated is,

$$\text{N. A. C. C. hp.} = \frac{D^2N}{2.5}$$

at a piston speed of 1000 ft. per min., where

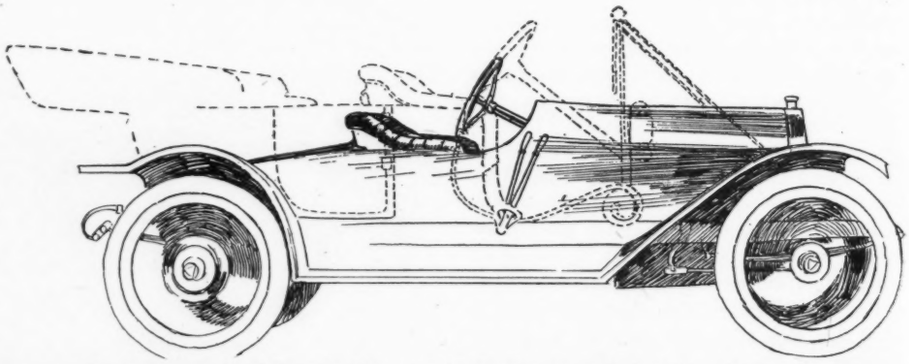


Fig. 3—Suggested body design for converting Hudson 20 touring car into speedster

D is the diameter of the cylinder bore in inches,

N is the number of cylinders, and

2.5 is a constant divisor.

To find the horsepower of a motor at 1000 ft. per minute piston speed, it is only necessary to know its bore and number of cylinders. Multiply the bore in inches by itself and then multiply the product by the number of cylinders and divide this by 2½. For instance: A four-cylinder motor with a 5-in. bore would be figured as follows: 5 squared equals 5 times 5, or 25, and 25 times 4 equals 100, and 100 divided by 2.5 equals 40, the N. A. C. C. horsepower of the motor.

LAPPING CYLINDERS WITH RINGS

New Piston Rings May Also Be Ground in This Way

Viborg, S. D.—Editor MOTOR AGE—Referring to the article in the January 18 issue of MOTOR AGE on lapping cylinders: Should one use a piston with rings, or not?

2—I have run my Ford 8,000 miles. Would lapping the cylinder walls in the engine help compression?

3—Does MOTOR AGE recommend valve grinding compounds for cylinder lapping.—Harvey Jenson.

1—Use an old piston, one which you do not intend to keep, and use old rings in it at first. Then, when the lapping of the cylinders is about completed you can lap the new rings in by inserting them into the old piston.

2—It is very possible that lapping would increase the compression, although the wear within the motor may have been so even throughout the period of driving that the effect has been virtually the same as lapping. You can find whether the cylinder is "lumpy" on its interior surface by examination and measurement with calipers. If it is out of true the lapping process will help matters.

3—They may be used with success.

LUBRICANTS CONTAINING CASTOR

Prepared Oils Used Extensively for Speed Work Entirely Satisfactory

Cedar Rapids, Ia.—Editor MOTOR AGE—I notice all of the racing cars and long-distance touring cars, which go out for a record, use some form of castor oil as a lubricant. This leads me to believe that there is a real merit in the use of non-carbon oil or a vegetable oil in a motor. Kindly give me the names of some of the manufacturers of this grade of oil and also give opinion regarding the life and liveliness of a motor in which this oil is used.—J. D. Blue, Jr.

We wish to correct your impression that all racing cars and long-distance record cars use some form of castor. A good portion of them do, but not all. There is indeed real merit in vegetable oil as a lubricant. Baum's Castorine Co., Rome, N. Y., White & Bagley Co., Worcester, Mass., Sexton Oil Co., Chicago. Oils containing castor are excellent lubricants.

INFORMATION ON DOBLE STEAMER

No Record of Car's Speed—Made by General Engineering Co.

Covington, Ind.—Editor MOTOR AGE—Kindly publish a cut-out view of the Doble steam car now manufactured by the General Engineering Co., Detroit, Mich., showing the generator and the rear axle construction.

2—What speed has this car?

3—What is Mr. Abner Doble's address?

4—Was the Stutz speed record broken at Sheepshead Bay Saturday?

5—Will the Stutz race next year?

6—What is the largest electric lighting generator made, and the cost of such a generator?

7—Would the back of a car, where the gasoline tank is generally carried, be a good place for the storage battery? If not, why?

8—Will a storage battery operate a small electric stove?

9—Did Eddie Pullen use one of the new Mercers in the New York races?

10—What is the horsepower of the Mercer which Pullen drove at Ascot Park?

11—Is the Blitzen Benz, which Bob Burman drove, still in running order?

12—What has become of Ernie Moross?—A Subscriber.

1—The description and illustration will be published in an early issue.

2—There is no official record of the speed of this car.

3—General Engineering Co., Detroit, Mich.

4—No.

5—The factory has made no announcement.

6—You ask for the largest generator made. Do you mean largest in actual bulk, or the one which will produce the highest voltage and amperage?

7—No. The storage battery does not want to be exposed to the weather. It should be so located that minimum dust and dirt will touch it.

8—Yes, however, so much current would be consumed that its use would be very inadvisable.

9—Yes.

10—The N. A. C. C. rating is 22.5.

11—Yes.

12—To the best of our knowledge Moross is still interested in a barnstorming racing team.

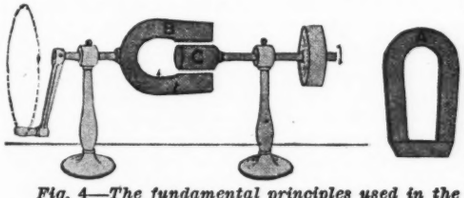


Fig. 4—The fundamental principles used in the Owen magnetic transmission

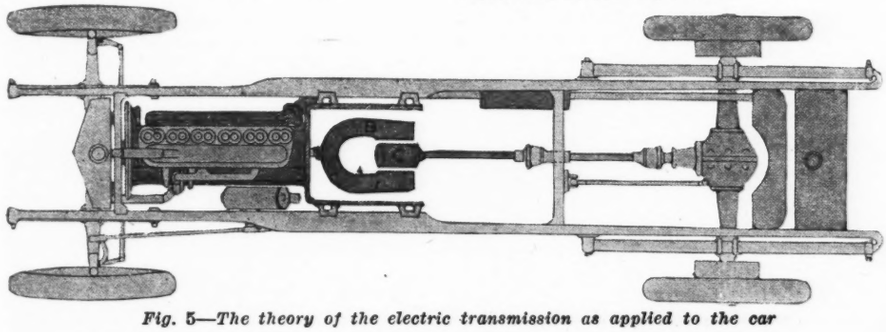


Fig. 5—The theory of the electric transmission as applied to the car

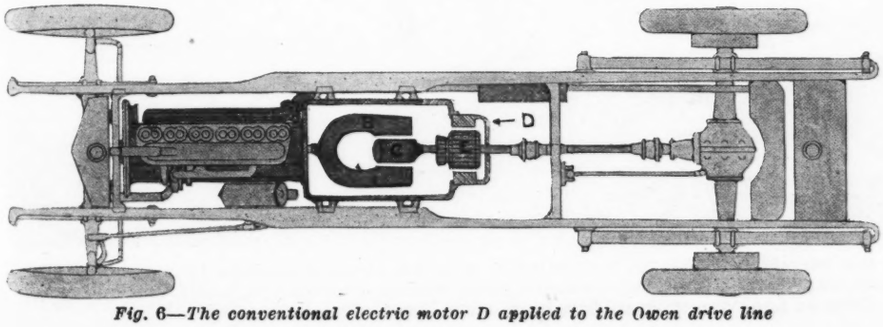


Fig. 6—The conventional electric motor D applied to the Owen drive line

Oil in Gasoline

Synarep, Wash.—Editor MOTOR AGE—Is there any benefit derived from putting oil in gasoline? Does it give one more mileage?—Ray Montgomery.

Very little if any. The present day gasoline is hard enough to vaporize as it is.

Lighting With Genemotor

Wichita Falls, Tex.—Editor MOTOR AGE—Can a chain-driven Genemotor starter be used to charge a 6-volt battery for lighting only?

2—What make of steering gear and transmission is used on the Winton cars?—B. E. W.

1—Yes. Wiring can be the same as when both starting and lighting.

2—The Winton company makes its own motor.

Has Rotary Valve Engine

Grand Junction, Colo. — Editor MOTOR AGE—In your edition of Feb. 8, page 48 we note a short article regarding rotary valves for internal combustion engines. For your information and that of interested readers would state that we have a one-cylinder rotary-valve engine installed in our factory and have been using it successfully for nearly a year. This engine is subject to none of the objections cited by you and is giving entire satisfaction. —Grand Junction Tool & Awning Co.

Parts for Cutting

Bartlesville, Okla.—Editor MOTOR AGE—What make of motor was used on the Cutting model B40 1913 model, also what make of transmission, or did the company make its own motor transmission?

2—Where could I secure parts for the Cutting cars?

3—Are the Krit cars going to be manufactured?

4—Where could I purchase an automatic cut out for a Jesco generator and starter?—Alfred Rittershaches.

1—Wisconsin motor, made by the Wisconsin Motor Mfg. Co., Milwaukee, Wis.

2—Puritan Machine Works, Detroit, Mich.

3—No.

4—Roth Brothers Electric Co., Chicago.

Among the Makers and Dealers

GETS PEERLESS AGENCY—The Joseph McCormick Co., Providence, R. I., has been appointed Peerless dealer at that place.

Ajax Rubber Declares Dividend—The Ajax Rubber Co., New York, has declared a quarterly dividend of $1.25, payable March 15 to stock of record Feb. 28.

Double Seal Moves to Detroit—The Double Seal Tire Valve Co. has moved its offices and factory from New York to Detroit. The change will make it possible for the company to produce valves in larger quantities.

Deutsch with Clum Mfg. Co.—S. Deutsch has become associated with the Clum Mfg. Co., maker of motor car switches, Milwaukee, Wis., as vice-president and sales manager, with offices in Detroit.

Kellogg Addition About Ready—The Kellog Mfg. Co., Rochester, N. Y., is about ready to start production in its new addition to the factory. Remodeling has increased the space in shipping rooms and offices.

Two Stephens Distributors Appointed—A. L. Dineen, Des Moines, Iowa, has been appointed state distributor for the Stephens six. The David Motor Car Co., St. Louis, Mo., will be the distributor for eastern Missouri and the western half of southern Illinois.

Fulton Truck to Expand—The Fulton Motor Truck Co., Farmingdale, L. I., has placed orders for the erection of a 40,000 ft. addition to its plant. The company originally planned a production of 1000 chassis for 1917, but it is planned now to increase it to 2000, owing to dealers' contract already made.

Guaranty Securities Corp. Elects—The Guaranty Securities Corp., New York, has elected the following officers: President, George C. Van Tuyl, Jr.; second vice-president and treasurer, E. S. Maddock; secretary, J. Alexander; assistant secretary and assistant treasurer, F. A. Franklin; assistant treasurer, W. J. Bold.

Newlin Leaves Factory for Agency—William B. Newlin, with the Pierce-Arrow Motor Car Co., Buffalo, N. Y., many years, has left the factory to sell Pierce-Arrows in Texas and Oklahoma. Mr. Newlin returned from Europe, where he was stationed as service engineer, about a year before the war to take the management of the sales promotion department and has been passenger car sales manager for more than a year now. He will be vice-president and sales manager of the Gray, Reardon, Newlin Co., Dallas, Tex.

To Sell Miller Carbureter—The Miller Carbureter Sales & Service has been appointed agent for the Miller carbureter in the Cleveland, Ohio, territory. H. S. Thomas is manager.

Rice Leaves Eclipse—A. C. Rice, formerly plant sales manager of the Eclipse Machine Co., Elmira, N. Y., has resigned and is to be general sales manager of the Cyclemotor Corp., Rochester, N. Y.

Kelly Field Co. Moves—The Kelly Field Co., selling agent for the Lee Tire & Rubber Co., Conshohocken, Pa., is moving its offices to the home offices and factory of the Lee Company at Conshohocken.

Brackenridge Leaves General Motors—G. T. Brackenridge, who has been with the General Motors Co., has resigned and accepted a position with the American Forging & Socket Co. at Pontiac, Mich.

Detroit Lubricator Makes Appointments—D. W. Kreidler has been appointed chief engineer of the carbureter division of the Detroit Lubricator Co., Detroit, and C. G. Spice has been made experimental engineer.

Cope Engineer for Bantam Co.—H. T. Cope, former secretary and treasurer of the Trio Mfg. Co., Detroit, has joined the Bantam Ball Bearing Co. as mechanic and sales engineer. Mr. Cope was with the Trio company until that concern was sold to the National Machine Products Co.

Hood Service Discontinues Department—The Wallace C. Hood Service Bureau, Detroit, has discontinued the auditing and accounting departments, formerly under the direction of Thomas D. Culberhouse. Mr. Culbertson has resigned to continue his regular work as a public accountant. James E. Morgan, secretary of the bureau, has been made secretary and treasurer.

Herschell-Spillman Elects—The following officers have been elected by the Herschell-Spillman Co., North Tonawanda, N. Y.,: President, T. J. Wilson; vice-president and general manager, Guy White; secretary and treasurer, E. O. Spillman; assistant secretary, A. N. Hathaway. A 2 per cent quarterly dividend was declared, payable March 30.

Is Mechanical Engineer for Simms—Paul Arthur has joined the Simms Magneto Co. as mechanical engineer.

Universal Motor Buys Plat—The Universal Valveless Motor Co. has purchased a tract of land at Muskegon, Mich., for a new plant.

Detroit Lubricator Co. Appoints—B. W. Kriedler has been appointed chief engineer and C. G. Spice, experimental engineer of the Detroit Lubricator Co., Detroit.

Starke Resigns from Maxwell—George Starke has resigned from the Maxwell Motor Co., Detroit, as director of publicity and has joined the Campbell-Ewald Co. in a like capacity.

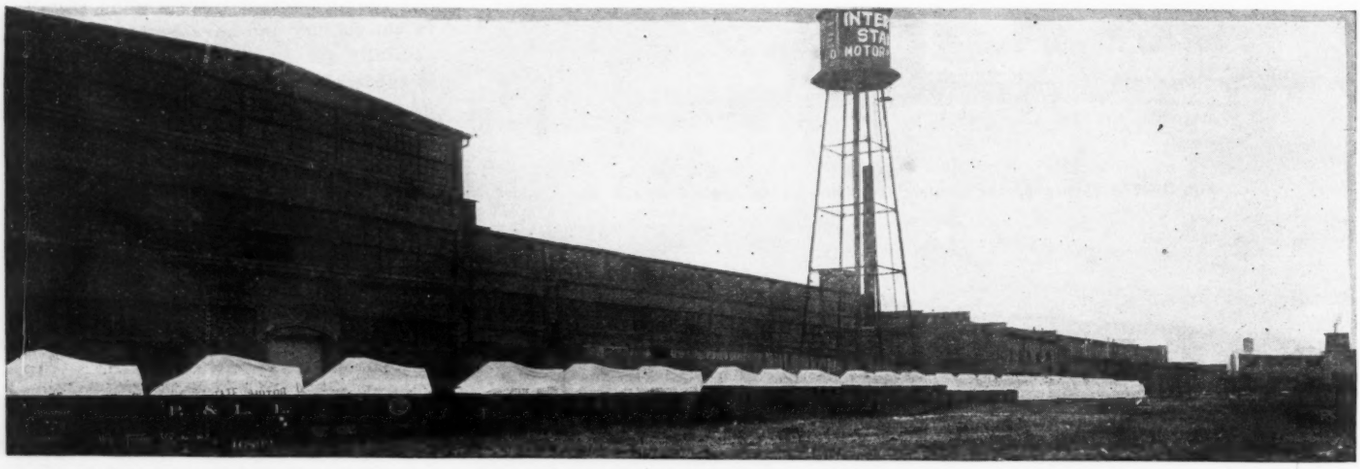
Walker Heads Walker Joint Co.—F. George Walker has resigned from the Raybestos company and is now president of the Walker Joint Co., manufacturer of universal joints, with offices in Detroit. Harold F. Allen is treasurer.

Frost Gear Elects—The Frost Gear Co., Jackson, Mich., reports sales of $1,246,000 for the last year. Five hundred persons are employed. Officers recently elected are: President, E. E. Frost; vice-president, M. C. Townley; secretary, Robert Smith; treasurer, A. S. Glasgow.

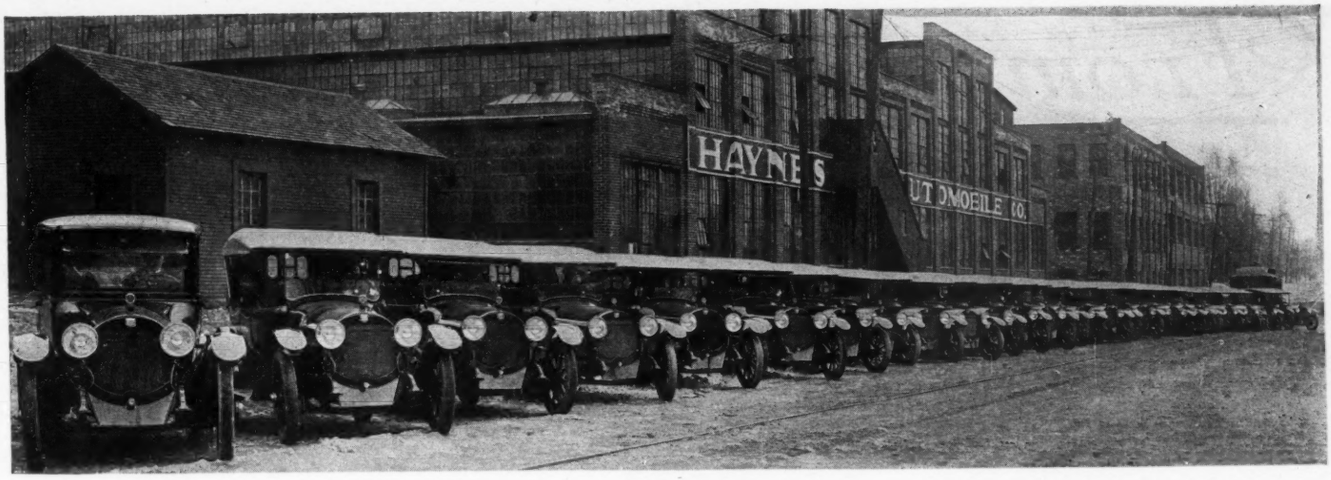
Joins Regal Staff—C. Carker, formerly traveling representative in England for the Haynes Automobile Co., has joined the sales force of the Regal Motor Car Co., Detroit, as a district manager. W. H. Martleman, formerly Regal distributer at Philadelphia, has rejoined the Regal company as district manager at Philadelphia.

New Truck Company Formed—The Durable Motor Truck Co. has been organized at Hammond, Ind., with a capital stock of $500,000. A factory building has been purchased, and the concern will commence operations at once in the manufacture of small trucks. The officers of the new company are: President, Joseph Studer; treasurer, Charles A. Foss; secretary, C. Brown.

2-Ton Truck Planned—The Noble Motor Truck Co. has been organized at Kendallville, Ind. The capital stock is $30,000. The company will manufacture a standardized motor truck having a capacity of 2 tons.



INTER-STATE USES FLATS—For months the Inter-State Motor Co. tried to avoid using flat cars and gondolas for shipments, but they finally came to it. In this trainload are cars for Oklahoma City, Okla., Hobart, Okla., Kansas City, Mo., St. Louis, Mo., Spokane, Wash., Fond du Lac, Wis., Denver, Colo., and Ogden, Utah



WHEN DRIVEAWAYS ARE IN ORDER—The freight embargo resulted in many driveaways. Above is the line-up of a driveaway to Detroit from the plant of the Haynes Automobile Co., at Kokomo, Ind. One week the Haynes' Detroit representative took fifty-two cars by the overland route

The manufacture of smaller and larger trucks will also be the aim of the new company. C. J. Munton is president; H. L. Postel, vice-president; G. M. Patterson, secretary; and H. W. Bradtmiller, treasurer.

Hoosier Concern Increases Capital—The Hoosier Sub-carbureter Co., Dunkirk, Ind., has increased its capital stock from $10,000 to $25,000 and announces its principal place of business has been changed to Indianapolis, Ind.

Brazil Motors Buys Plant—The Brazil Motors Co., Brazil, Ind., recently incorporated to manufacture a front-drive truck, for which patents now are pending, has bought a plant, and the place will be put into repair as soon as possible and machinery purchased for the beginning of operations.

Warner Gear Increases Capital—The Warner Gear Co., Muncie, Ind., has increased its capital stock from $500,000 to $1,500,000.

Lyons Buys Hume Plant—The Lyons Atlas Co., manufacturer of internal combustion and Diesel engines, has purchased the plant of the Hume Mfg. Co., Hume, Ill., manufacturer of farm tractors, and the plant will be moved to Indianapolis, Ind. Patents and stock parts of the Illinois company also were acquired, and farm tractors will be manufactured on a large scale. The company hopes to place 5000 general-purpose farm tractors on the market this year. Its force of workmen will be increased from 1200 to 1600.

To Make Holmes Car—The Holmes Automobile Co., Canton, Ohio, will incorporate for $2,500,000 to build motor cars. The incorporators are Arthur Holmes, Charles Rockwell, George Belden and C. G. Herbruck. These incorporators will complete the sale of stock, $800,000 of which already has been subscribed. The capitalization will be divided into $1,000,000 common and the rest preferred. Arthur Holmes is the designer of the new car.

Recent Incorporations

Ashland, Ky.—Nelson Motor Car Co.; capital stock, $10,000; incorporators, J. H. McCleart, Hays Nelson and E. L. Helfrich.

Canton, Ohio—Dine-DeWees Co.; capital stock, $100,000; to deal in motor car accessories; incorporators, Howard N. Dine, Karl W. Konewirth, Ervin H. Rogers, Herbert E. DeWees, Fred C. Pontius and Morris Allen.

Charlotte, N. C.—Southern Motor Co.; capital stock, $125,000; incorporators, Frank Fairfield, R. L. Little and W. L. Nicholson.

Charleston, Pa.—Central Taxicab Co.; capital stock, $10,000; incorporators, L. L. Dunbar, Charles J. Hogg, E. L. Mason, D. W. Dunbar and C. W. Dering.

Chicago, Ill.—Keystone Motor Co.; capital stock, $10,000; incorporators, William Brinkman, B. F. Bartel and William Hardy.

Cincinnati, Ohio—The Denmo Cincinnati Sales Co.; capital stock, $10,000; to sell trucks; incorporators, Chas. B. Meyers, L. E. Orr, Edna Molitor, David Davis and J. G. DeFosset.

Cleveland, Ohio—Stahl Gear & Machine Co.; capital stock, $50,000; to manufacture gears; incorporators, George F. Stahl, Walter L. Stahl, Philip A. Gross, Jessie M. Stahl and John M. Routson.

Cleveland, Ohio—Efta Co.; capital stock, $25,000; to operate a garage; incorporators, William Wisner White, Thomas H. Garry, E. M. Crowe and C. A. Flynn.

Cleveland, Ohio—Acme Tire & Supply Co.; capital stock, $50,000; to deal in tires and supplies; incorporators, M. M. Gibbons, H. J. Alperin, M. Levine, Stella Alperin and Lena Alter.

Cleveland, Ohio—H. & F. Tire Co.; capital stock, $10,000; to deal in tires and supplies; incorporators, Herman Gnewotta, Fred W. Gnewotta, Henry F. Droste, William Wenzel and William E. Hunger.

Cleveland, Ohio—The Hough Ave. Garage & Auto Co.; capital stock, $30,000; to operate a garage; incorporators, W. J. Woods, C. W. Woods, Wm. G. Benedict, J. M. Hurlbut and L. M. Butler.

Coldwater, Kan.—Standiford Two State Valveless Motor Co.; capital stock, $10,000; incorporators, F. A. Standiford, Ed Weimert and Dr. E. M. Ireland.

Columbus, Ohio—Markel-Maxwell Co.; capital stock, $15,000; to deal in motor cars; incorporators, Harley R. Markel, C. M. G. Johnson, T. A. Rager, Arthur R. Markel and E. M. Markel.

Green Bay, Wis.—The Oneida Motor Truck Co.; capital stock, $300,000; to manufacture motor trucks, tractors, parts, accessories, etc.; incorporators, Mitchell Joannes, S. H. Cady, J. C. Fogarty, and others.

Hartford, Wis.—The Lohr Auto Co.; capital stock, $15,000; to sell new and used cars, operate a garage, etc.; incorporators, C. H. Lohr, Edward T. Carey and Louis Frederickson.

LaCrosse, Wis.—The Agrimotor Engineering Co.; to manufacture and deal in agricultural machinery, tractors, engines, etc.; capital stock, $20,000; incorporators, C. W. Lewis, C. H. Schweitzer and John E. McConnell.

Lexington, Ky.—Dixie Automobile Co.; capital stock, $5,000; incorporators, John L. Buckley, Robert Beatty and H. A. Cook.

Lima, Ohio—The Lima Jeffery Auto Co.; capital stock, $10,000; to sell motor cars; incorporators, H. L. Pew, W. R. Mumaugh, R. G. Mumaugh, H. W. Neff and T. W. Blackburn.

Louisville, Ky.—Stiles Motor Co.; capital stock, $50,000; incorporators, K. S. Stiles, J. W. DeHart and J. M. Clifford.

Macon, Mo.—Reichel Motor Co.; capital stock, $40,000; incorporators, Theodore Reichel, D. W. Acuff and J. W. Hatton.

Manitowoc, Wis.—The Manumotors Co.; capital stock, $20,000; to manufacture motors, engines, motor boats, etc.; incorporators, William E. Kawalla, Karl J. Kawalla and Victor C. Trastek.

Milwaukee, Wis.—The Curtis Rubber Co.; capital stock, $25,000; incorporators, Frank J. Ramler, Charles E. Jones, Julian Olds and others.

Milwaukee, Wis.—The Farwell Garage Co.; capital stock, $5,000; to operate garage and repair shop, deal in new and used cars, etc.; incorporators, I. G. Harriman, S. S. Thompson and Thomas A. Bowe.

Muskogee, Okla.—Cossey Tire & Supply Co.; capital stock, $5,000; incorporators, Wallace Cossey, Cora B. Cossey and J. Frank Davis.

Muskogee, Okla.—Marsh Motor Supply Co.; capital stock, $15,000; incorporators, W. Ralph Marsh, J. L. J. Graffenreid and William H. Davis.

Norwalk, Ohio—Norwalk Garage & Supply Co.; captial stock, $40,000; to operate a garage; incorporators, Chas. F. Smith, Vance J. Parker, Peroy P. Parker, H. C. Smith and C. B. Baker.

Pittsburgh, Kan.—C. & A. Auto Supply Co.; capital stock, $25,000; incorporators, L. J. Flack, J. W. Goodwin and F. W. Newman.

Protection, Kan.—Anderson Dust Guard & Sheet Metal Mfg. Co.; capital stock, $20,000; incorporators, Frank Anderson, W. E. Snyder and Ira Wills.

San Antonio, Tex.—Universal Car Co.; capital stock, $15,000; incorporators, Robt. S. Yantis and Chas. K. Biggs.

Scranton, Pa.—National Tire Protector Co.; capital stock, $50,000; incorporators, Daniel Melchor, Max F. Henkleman and Florence J. Helriegel.

Statesville, N. C.—Ed. G. White Motor Co.; capital stock, $50,000; incorporators, Ed. G. White, R. V. Brawley and Dorman Thompson.

St. Louis, Mo.—Globe Motor Truck Co.; capital stock, $150,000; to manufacture and sell motor trucks and other vehicles and all appliances for motor cars; incorporators, Chas. H. Phillips, Ernest Hausman and Wm. Carr.

St. Louis, Mo.—Kerosene Motor & Tractor Co.; capital stock, $10,000; to manufacture, sell and deal in motor trucks, machinery, etc.; incorporators, George P. Weber, James W. Leonard, L. E. Brandenburger, Geo. C. Weber and Charles F. Deltz.

Stevens Point, Wis.—The Bukolt Mfg. Co.; capital stock, $200,000; to manufacture steelshod protectors for motor car tires and other specialties; incorporators, John J. Bukolt, P. Bukolt and Frank Derezinski.

Sturgeon Bay, Wis.—The Sawyer Garage Co.; capital stock, $10,000; to operate a garage, repair shop and deal in motor vehicles; incorporators, David Machia, Edward Hunt and Andrew Bursen.

Toledo, Ohio—The Superior Garage Co.; capital stock, $20,000; to operate a garage; incorporators, E. H. Sedgwick, Ed. C. Wackle, H. W. Henning, R. L. Elton and W. W. Campbell.

Wichita, Kan.—Arnold Automobile Co.; capital stock, $50,000; incorporators, M. L. Arnold, R. E. Arnold and S. Arnold.

Youngstown, Ohio—Republic Rubber Sales Co.; capital stock, $10,000; to deal in tires; incorporators, John T. Harrington, J. W. Blackburn, U. C. DeFord, Clyde W. Osborne and Fred J. Helm.

From the Four Winds

AGENT IS INVENTOR — Aeroplane propellor sleigh made by Walter Williams, a dealer at Bloomington, Ill.

SALES INCREASE DESPITE WAR—Though Canada shows the effects of the long war as does her mother country it is estimated that the farmers spent $2,000,000 more for cars last year than in any other year. The war crop of wheat is giving the farmers a large profit, and this is given as a reason for the increased purchase of cars.

Lightning Strikes Moving Car—Herbert Hamer and Peter Kief, both of Hartsburg, Ill., met with a unique experience while driving in their car near that city recently. Overtaken by a thunderstorm, their car was struck by lightning. The bolt severely burned the neck and face of Hamer and then went through the body of the car, tearing a tire off a rear wheel.

Ft. Dodge Visits Neighbor—Thirty dealers of Fort Dodge, Iowa, members of the Fort Dodge Automobile Dealers' Association, went to Des Moines in a special train last week and were guests of honor at the Des Moines show Wednesday. They were entertained by the Des Moines Dealers' Association. George Tremaine, a Fort Dodge dealer, organized the trip.

Texas to Perfect Organization—Call has been issued for a meeting of Texas dealers at Dallas, March 7 and 8, when permanent organizations of the Texas Automobile Dealers' Association will be effected. The dealers met last month at Austin and formed a temporary organization with a membership of thirty. This roll has increased until there are now 100 members.

Pa. Farmers Use More Cars—A year ago about 22,000 farmers were using motor cars for business and pleasure in Pennsylvania. Now the number has increased about 50 per cent. Fourteen per cent of them are using cars this year. About 976 trucks are in use on farms in the 700 townships from which reports were available and at this rate about 2,100 are used in the state.

Cars Meet in Snow Drift—Two road testers were trying out a couple of Marion-Handleys near Jackson, Mich., and hit a snow bank on the road. The cars were coming toward each other, so that put one on each side of the bank. The cars would back a hundred feet or so and then run full speed ahead into the snow. The drift was about 200 ft. deep, it is said, but the cars managed to meet all right.

War Service Station Planned—Through the War Department the United States Government has been in communication with President Christian Girl of the Standard Parts Co. of Cleveland, Ohio, regarding the establishment of a service station for motor trucks in El Paso, Tex. The development follows the maintaining of a branch in that border city by the Perfection spring division of the Standard Parts Co.

European Motorists Have Hard Time—The city authorities of Vienna are thinking of withholding licenses from gasoline cars and permitting electrics only. All car taxes have been doubled in France. And Paris now has to pay 53 cents a gallon for gasoline.

Ceylon Import Duty on Cars—Motor cars imported into Ceylon are now subject to a duty of 100 per cent ad valorem, the new rate becoming effective Feb. 12. The duty on cars entering Ceylon recently was increased from 5½ to 33⅓ per cent ad valorem.

Buses Worse than Zeppelins There—When London darkened its streets to guard against attacks from Zeppelins, this method proved effective in that particular but bad in another. Since August, 1914, when the streets first were darkened, motor buses have killed 954 persons, while Zeppelins have killed 137.

A Boulevard Outside City—The board of park commissioners plans to construct a new park boulevard in Memphis, Tenn., at some distance from the present boulevard which circles the city. The city and county officials are expected to co-operate in establishing the proposed road, which is to be 25 miles long. The new parkway would be about 4 miles outside the city.

Burlington Way Divisions Unite—The three divisions of the Burlington Way were united under one head at a meeting of fifty supervisors at Bloomington recently. E. H. White of Springfield was elected president of the combined divisions; N. E. Franklin of Lexington, secretary-treasurer; Wade Allison of Gardner, general superintendent. The combined divisions will be known as the Main Street between Chicago and St. Louis.

To Canvass State for Members—Arrangements have been made by the reorganization committee of the Ohio Automobile Trade Association to start a vigorous membership campaign. The plan provides for solicitors to go throughout the state and visit dealers, garagemen, repair men and tire dealers and repairers. With the advance in price on all materials and labor, the great need for organization and co-operation among those engaged in every line fo the trade is more apparent than formerly.

Would Encourage Wide Tires—Col. Frank W. Buffum, state highway commissioner in Missouri, suggests that wide tires should be encouraged by rebates to keep the roads in better condition. He proposes a rebate of $2 a wheel in 1917 for each wheel having a wide tire, $1.75 a wheel in 1918 and 25 cents less each year until it is $1 in 1921 and for five years thereafter. He would then make wide tires compulsory. He would allow the owner of a wide-tired wagon to present a certificate of such ownership as part payment of his taxes.

To Co-operate on Highways—The City Beautiful League, Knoxville, Tenn., has arranged for the construction of several marble arches on the national highways leading into Memphis, Tenn. Each arch is to be 10 ft. in height and to have a span of 23 ft. At the top will be hung an electric sign bearing the words "Welcome to Knoxville." Local quarries have agreed to contribute the marble and the schools will plant trees along the roads, each one to be named after some celebrity. The railroads will aid by beautifying the right of way where their lines run along the highways.

Coming Motor Events

RACES
—1917—

May 19—Metropolitan Trophy, New York speedway.
†May 30—Indianapolis speedway.
†June 9—Chicago speedway.
June 23—Cincinnati speedway.
†July 4—Omaha speedway.
†July 14—Des Moines speedway.
†July 28—Tacoma speedway.
August 4—Kansas City speedway.
†September 3—Cincinnati speedway.
†September 15—Providence speedway.
†September 29—New York speedway.
October 6—Kansas City speedway.
October 13—Chicago speedway.
October 27—New York speedway.

†A. A. A. championship events for 1917.

SHOWS

March 3-10—Boston.
March 3-10—Washington, D. C.
March 5-10—Bridgeton, N. J.
March 5-10—Parsons, Kan.
March 5-10—Jamestown, N. Y.
March 5-12—Birmingham, Ala.
March 6-10—Fort Dodge, Iowa.
March 7-10—St. Joseph, Mo.
March 7-11—Phoenix, Ariz.
March 7-14—Canton, Ohio.
March 12-14—Fort Worth, Tex.
March 13-16—Vancouver, B. C.
March 13-16—Fargo, N. D.
March 14-17—Davenport, Iowa.
March 14-17—Parsons, Kan.
March 14-17—Kenosha, Wis.
March 14-17—Mason City, Iowa.
March 17-24—Pittsburgh, Pa.
March 19-24—Paterson, N. J.
March 19-24—Cedar Rapids, Iowa.
March 20-25—Denver, Colo.
March 21-24—Trenton, N. J.
March 27-31—Clinton, Iowa.
March 27-31—Deadwood, S. D.
April 4-7—Stockton, Cal.